TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

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...FOR LONG ROPE SERVICE IN THE OIL FIELDS

When it's time to switch rotary lines, be ready with tough, flexible *Preformed* Yellow Strand. It's engineered to take quick starts and stops . . . to withstand high speeds . . . to handle the heavy strings required by today's deep tests. For most rotary drilling and casing jobs you'll want 6x19 *Preformed* Yellow Strand, Seale construction, with independent wire rope core. Other B & B wire lines used around the rig, on winches and on pipe-laying equipment deliver corresponding stamina. Get a load of this assistance by specifying *Preformed* Yellow Strand.

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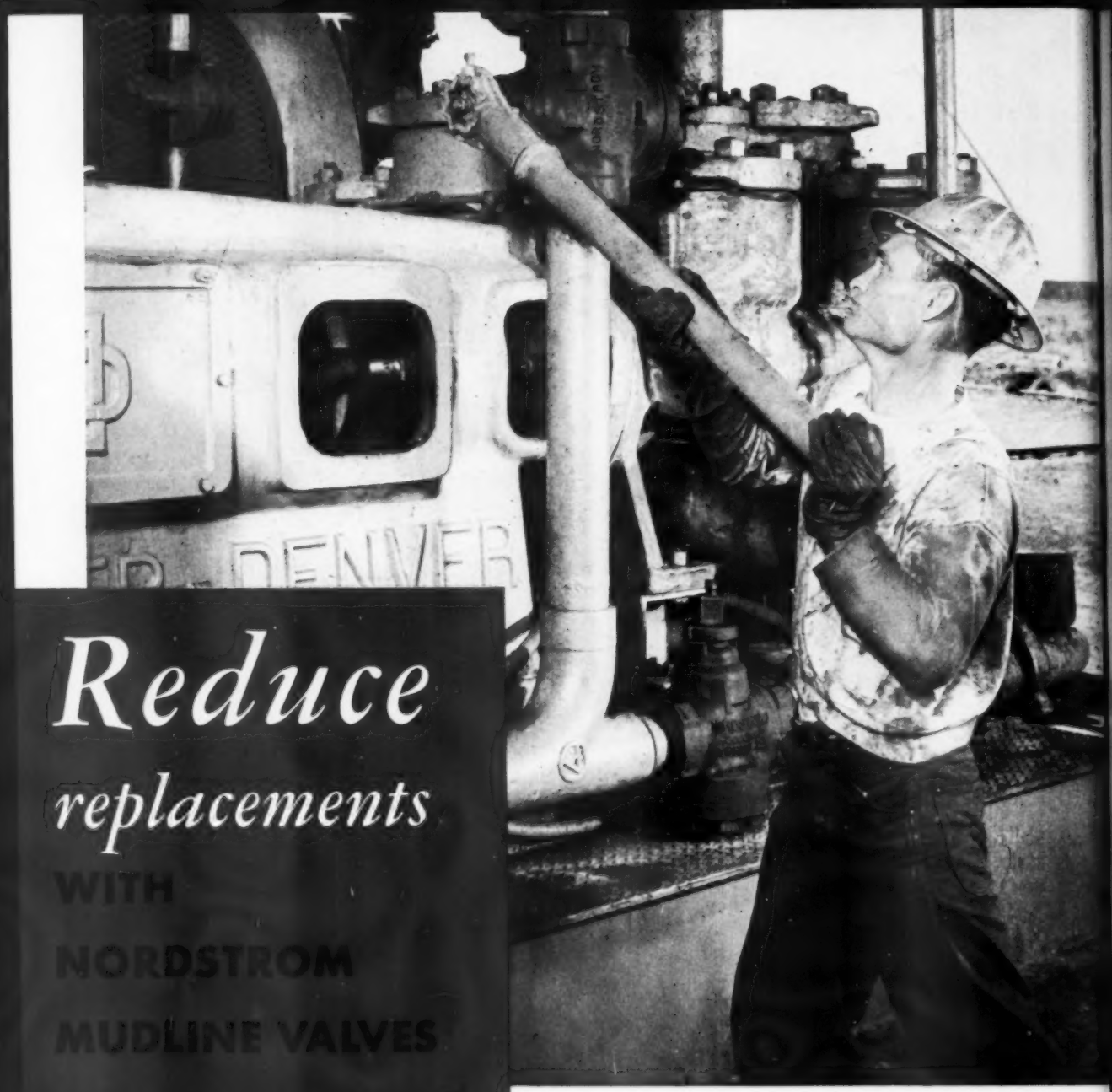

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- EASIEST TO OPERATE
- MERCHROME COATED FOR MULTIPLIED ENDURANCE

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AUTOMATICALLY LUBRICATED

Introduction of the Nordstom Hypreseal valve doubled and tripled valve endurance. Then Merchrome coating was added which again increased valve life to a phenomenal degree. Now, by use of Hypermatic lubricant even greater resistance is offered against abrasion because the valve is automatically lubricated so that leaks are prevented at the very beginning of abrasion attack.

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Nordstrom MUDLINE VALVES

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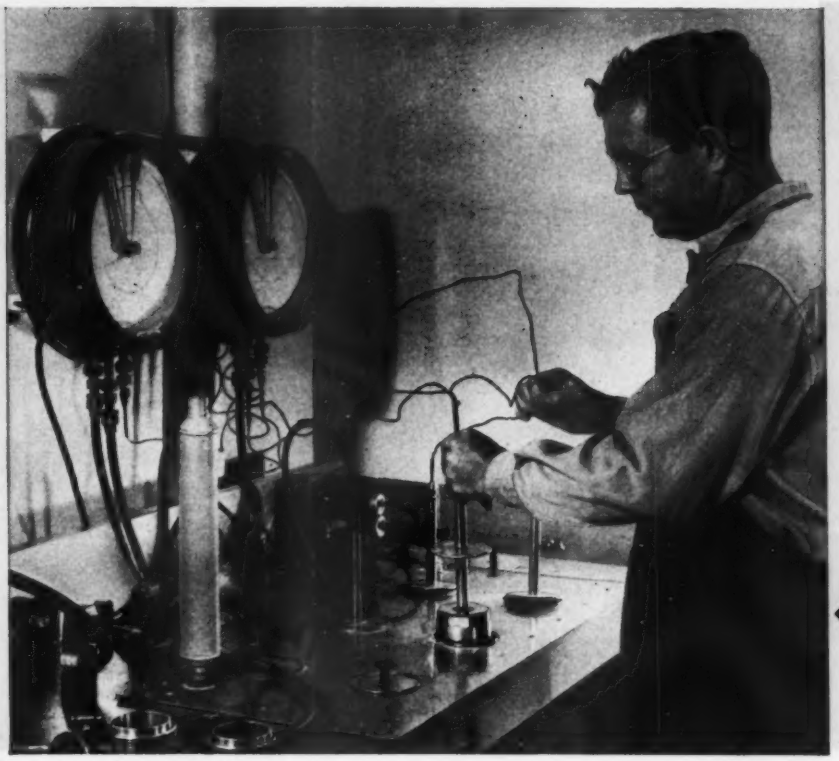

SEND FOR THESE IMPORTANT FACTS

Complete information on Du Pont Gasoline Antioxidants is contained in this 24-page book. Also much helpful information on correct handling procedures and methods of evaluating and adding antioxidants.

TO HELP YOU get the best results at the lowest cost with Du Pont Antioxidants, the five conveniently located Du Pont District Laboratories are at your service.

How you can gain greater storage stability by using DU PONT GASOLINE ANTIOXIDANTS

Since gasolines vary in their responses to available antioxidants, it will pay you to evaluate accurately the relative effectiveness of *all three* Du Pont Antioxidants—Nos. 5, 6 and 22.

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THE RELATIVE EFFECTIVENESS of these three Du Pont Antioxidants in your gasoline can be determined by tests in your own laboratory, or we will be glad to do it for you in the nearest Du Pont District Laboratory.

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This easy-starting Fairbanks-Morse "ZC" Engine gets your pumping rig off to a good start . . . *even on the coldest mornings.* Fairbanks-Morse High Tension Magneto supplies a "hot" spark that eliminates costly starting delays. There are no complicated parts in a "ZC" . . . no delicate adjustments to cause trouble. Maintenance is simplified, and costs are exceptionally low. Stop in at your supply store and see the Fairbanks-Morse "ZC" . . . the economical answer to any pumping problem. Fairbanks, Morse & Co., Chicago 5, Illinois.

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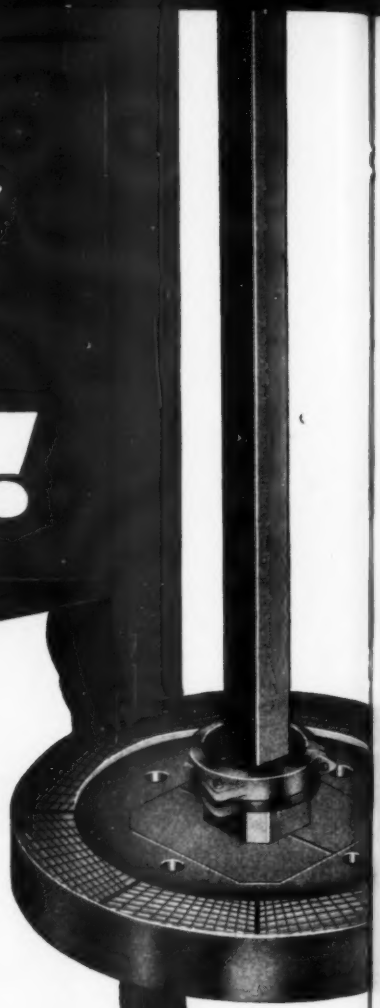
For Economical, Dependable Rotation of Your Drilling String

USE AMERICAN IRON

Hex or Square

KELLYS!



HEX KELLYS

American Iron Hex Kellys are made from *fully heat treated* alloy steel forgings for longer wear and greater resistance to torsional stresses. Driving surfaces are machine finished—and circulation holes precision bored—for smoother running and proper balance at all drilling speeds. Our manufacturing processes and scientific inspection insure straightness, joint alignment, concentricity of bore, hardness and precision threaded connections.

SQUARE KELLYS

American Iron Square Kellys are also made from a heat treated one piece alloy steel forging with top and bottom integral upset ends formed during the forging operation. The radius on the square of the driving surface is correctly formed during the forging operation. Correct forging processes plus straightness, joint alignment, concentricity of bore, hardness and precision threaded connections, make the American Iron Square Kelly the best balanced square kelly available.

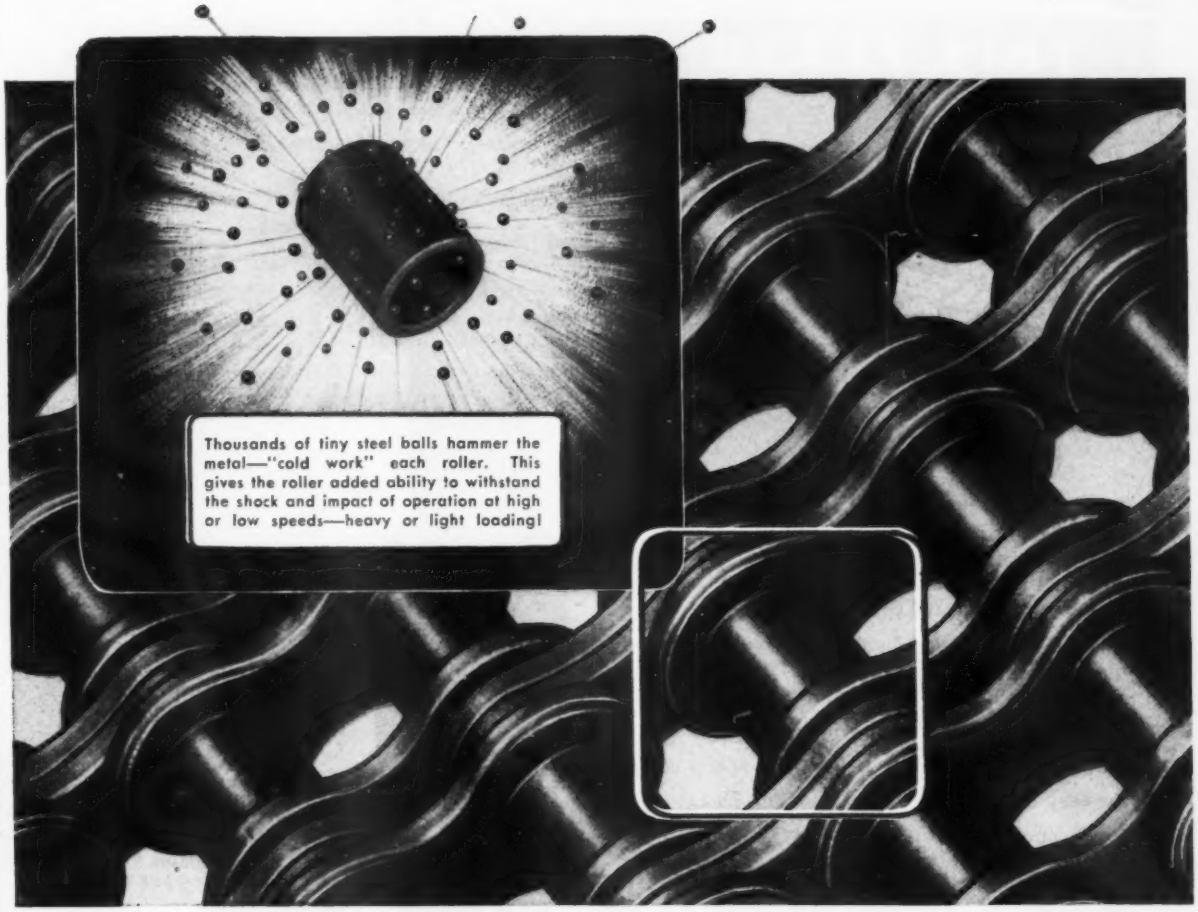
BALANCED FOR SMOOTH RUNNING at all drilling speeds

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF OIL FIELD EQUIPMENT
OKLAHOMA CITY U.S.A.

Get the roller chain with rollers that are

SHOT PEENED

for EXTRA fatigue life!


Thousands of tiny steel balls hammer the metal—"cold work" each roller. This gives the roller added ability to withstand the shock and impact of operation at high or low speeds—heavy or light loading!

You get this added feature in every LINK-BELT Roller Chain

You get absolute uniformity, too. No highs. No lows. Just smooth, flowing dependable chains that pay off in wide flexibility—greater performance—longer life.

You see, LINK-BELT Roller Chains are made from carefully selected materials with controlled heat treatment to assure uniformity and absence of weak members, then—rollers are shot peened to give them the extra fatigue life needed for today's higher speeds and heavier loads.

Link-Belt Roller Chain is available in single or multiple widths, in 3/8" to 3" pitch and double pitch. If you have a roller chain problem, see the LINK-BELT engineer nearest you.

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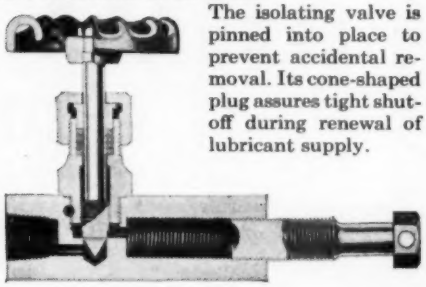
COMPARE

THIS FEATURE

OF THE HONEYWELL SERIES "700" VALVE

SAFETY STEM LUBRICATOR

The Stem Lubricator of stainless steel bar stock has an isolating valve for maintaining safe conditions *at all times*.



The isolating valve is pinned into place to prevent accidental removal. Its cone-shaped plug assures tight shut-off during renewal of lubricant supply.

Specially Designed Neoprene Diaphragm

Duplex Upper Stem Guide

One-Piece Bonnet

Packless Bellows Seal

Wide Variety of Discs

Reversibility in the Field

✻ Compare the Safety Stem Lubricator of this valve with that of any other wide band proportional type. Look at it closely . . . study it feature by feature.

Then check the other features of the valve . . . the Specially Designed Diaphragm, the Duplex Stem Guide, the One-Piece Bonnet, the Packless Bellows Seal, the wide variety of discs, the easy reversibility in the field.

Your comparison will prove that the Honeywell Series 700 has *all* of the features you look for in a fine valve.

It's available in a wide range of styles and sizes. For detailed information, write for a copy of Bulletin 700-2, or call in your local Honeywell engineer . . . he is as near as your phone.

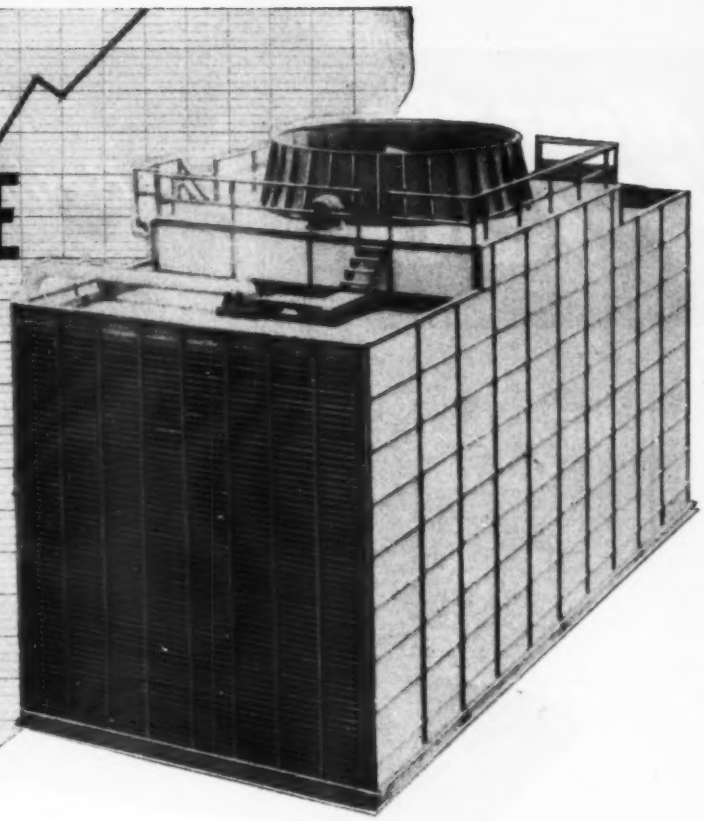
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

New Bulletin 750, "Control Valve Sizing Data," is now available

MINNEAPOLIS **Honeywell**

VALVE PRODUCTS

PEAK PERFORMANCE DEMANDS MARLEY DOUBLE-FLOW



As the production curve ascends, Marley DOUBLE-FLOW owners increasingly will know the double satisfaction of a good investment and a problem solved.

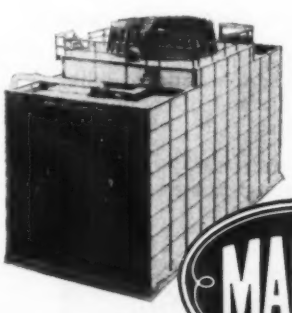
Marley patented DOUBLE-FLOW design long has been accepted as the standard for functional efficiency. *Now* the exclusive DOUBLE-FLOW features that make for every-minute operation are of utmost importance.

Only DOUBLE-FLOW OPEN DISTRIBUTION permits cleaning in minutes instead of hours and without complete shutdown. Only DOUBLE-FLOW design reveals tower operating condition at a glance. And Marley MECHANICAL EQUIPMENT, engineered for cooling tower service exclusively, is a final assurance of uninterrupted service.

DOUBLE-FLOW has a definite place in your production picture . . . let your nearest Marley Application Engineer explain it without obligation or write for Bulletin DF-50.

Also Producers of

AQUATOWERS
DRICOOLERS
VAIRFLO TOWERS
NATURAL DRAFT TOWERS
SPRAY NOZZLES



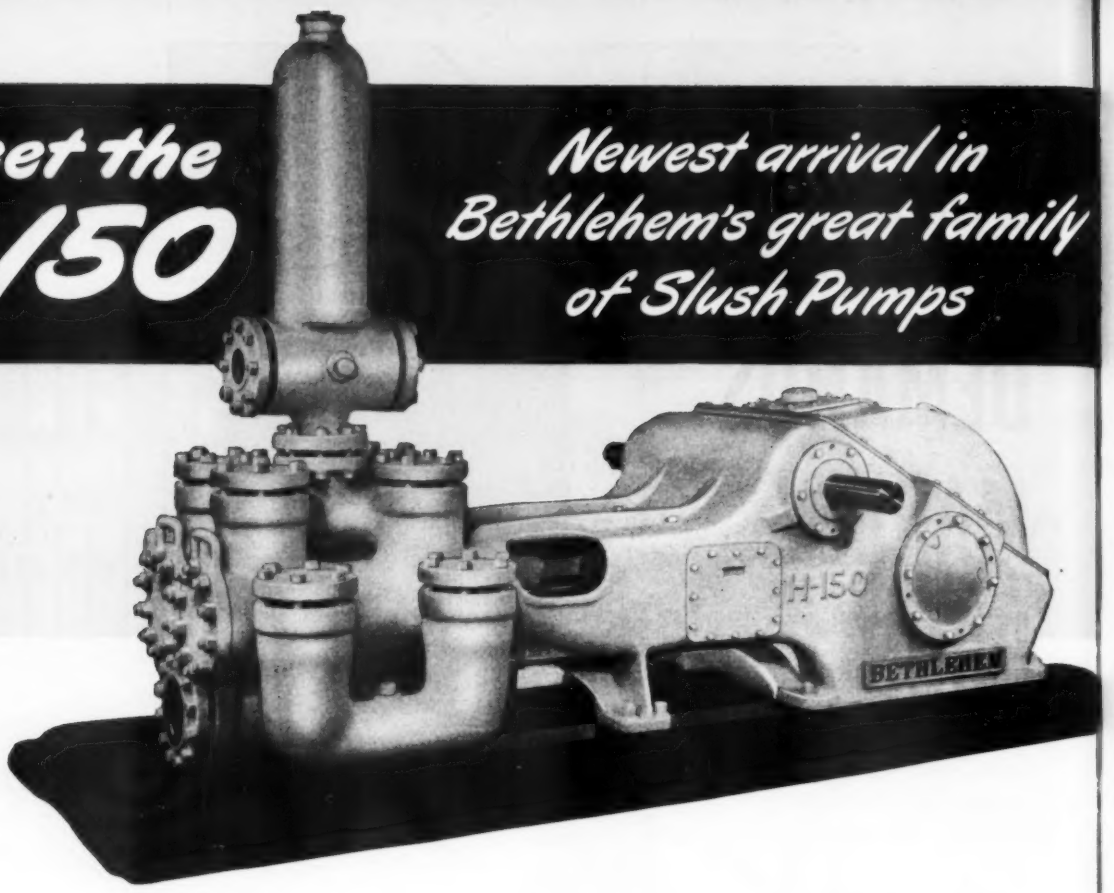
MARLEY

The Marley Company, Inc.

KANSAS CITY 15, KANSAS

Meet the H-150

Newest arrival in Bethlehem's great family of Slush Pumps



Here's a sturdy little fellow that's built for plenty of man-sized work. It's Bethlehem's brand-new H-150 Pump — a unit designed for shallow drilling assignments to 4,000 ft. You'll find it perfect, too, for mud-mixing or lease gathering chores.

The H-150 has features usually found only in larger, more expensive pumps. Note, for example, these eight major points:

- Pulley extension on both sides for right- or left-hand drive
- 100 pct oil-bath lubrication
- All-steel fluid end that more than meets ASME specification for unfired pressure vessels of its size
- API metal ring gaskets for valve covers, stuffing-box housing flanges, discharge flanges, and strainer-housing flanges
- Tell-tale hole that protects fluid end from washouts if packing fails
- Alloy-steel gear made from rolled seamless forging
- Alloy-steel pinion integral with shaft made from heat-treated forging
- Roller bearings throughout, including double tapered-roller type at main bearings and crank-throw end of connecting rods to reduce shock on the crankshaft

Ask to see and study the H-150. For customers fussy about the engineering they buy, this rugged little pump has everything!

SPECIFICATIONS

Bore and Stroke	7¼ in. x 12 in.
Maximum Input BHP @ 70 RPM	191
Maximum Working Pressure	1,185 lb
Gear Ratio	5.536 to 1
Weight less Skids	16,500 lb

BETHLEHEM SUPPLY COMPANY
General Offices: 21 E. Second Street, Tulsa, Okla.
Subsidiary of Bethlehem Steel Corporation
On the Pacific Coast Bethlehem Oil-Field Equipment is sold by Bethlehem Supply Company of California
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Looking back at 1950 . . . and ahead to '51*

IN THE

COLUMBIA GAS SYSTEM

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It was a record-breaking year . . . in number of customers served . . . in gas purchased from our Southwest suppliers . . . in enlargement of our facilities, including our underground storage.

This coming year, we expect even greater usage of gas and we shall endeavor to provide the best possible service to our customers . . . 24 hours a day!

**Full details are in the Annual Report of The Columbia Gas System, Inc., 120 East 41st Street, New York 17, N. Y. —available upon request.*

COLUMBIA GAS SYSTEM

The Columbia Gas System

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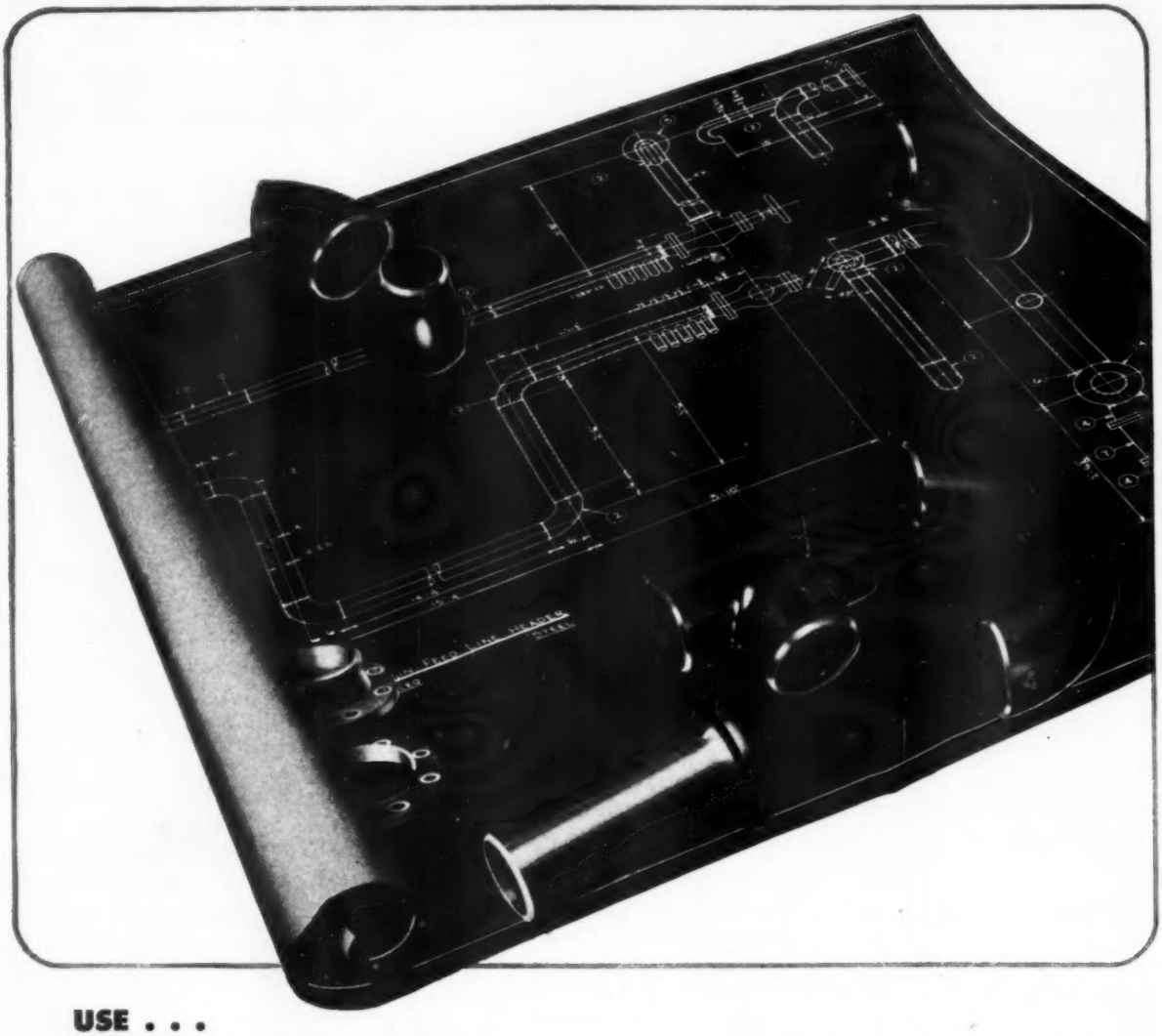
TO DO A BETTER PIPING JOB . . .



USE . . .

GLOBE PRECISION PROCESS SEAMLESS WELDING FITTINGS

When you specify and use Globe Welding Fittings you have the product of an organization with unusually broad metallurgical experience. Globe's precision-process method of production reaches back to the manufacture of the Globe seamless tubes themselves which are the "raw material" of Globe welding fitting fabrication.

GLOBE STEEL TUBES CO., Milwaukee 4, Wisconsin

Chicago • Minneapolis • Cleveland • Detroit • New York • Philadelphia St. Louis • Houston • Denver • San Francisco • Glendale, Cal.

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — carbon — alloy — seamless steel tubes — Globeiron seamless high purity ingot iron tubes — Globe Welding Fittings.

Send for the Globe Welding Fittings Catalog—and look to Globe as a preferred source of supply.

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.. the turbine that will fit in anywhere!

- True centerline supports
- Readily removable packing cases
- Sealed bearings
- Sealed governor
- Balanced double-seated valves
- Economical liner type bearings

Tailored to suit the actual requirements of your application because of the wide range of permissible modifications available to the basic design. These include speed governors, pressure governors, location of exhaust, auxiliary controls, etc.—all combined with spark-proof and totally enclosed construction. Write for fully descriptive bulletin.

H-725

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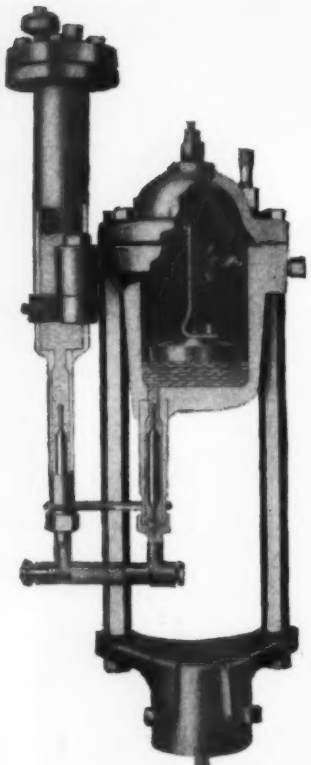


Proper float location gives you EXTRA METER VALUE

HERE'S HOW TEMPERATURE ERRORS ARE CANCELED

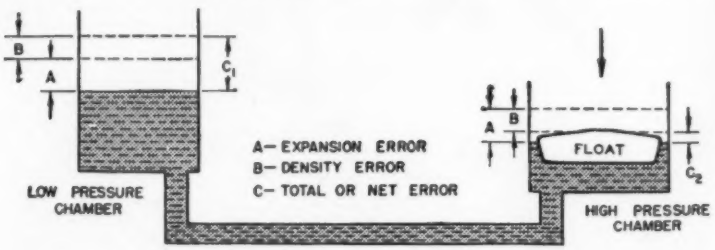
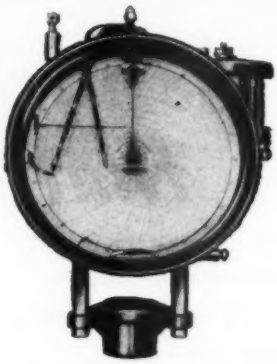


Diagram shows two distinct ambient temperature error factors (exaggerated for clarity) which affect the accuracy of mercury displacement type flow meters. On an increase in temperature, for example, the mercury expands and its level rises an equal amount (A) in both high and low pressure chambers. Mercury density also decreases because of the same increase in temperature, resulting in increased displacement (B) for a given differential pressure change. This increased displacement adds to error (A) in the low pressure chamber, causing a combined error C_1 — but *subtracts* from error (A) in the high pressure chamber, leaving only a negligible net error (C_2).

Better Design Throughout Assures Greater Accuracy with Foxboro Meters

Engineering thoroughness in every detail throughout Foxboro Flow Meters demonstrates conclusively why you get *extra meter value*. Locating the meter float in the high-pressure chamber is only one of many examples. Based on broader understanding of basic principles, this simple design feature utilizes two inherent sources of thermal error to offset each other. The result is highest sustained accuracy through the range of the instrument, regardless of temperature variations.

Even for your simple installations, you'll save money in the long run by employing Foxboro Meters. Write for Bulletin 351-2 describing these extra-values. **The Foxboro Company, 603 Neponset Ave., Foxboro, Mass., U. S. A.** Branches in 32 U. S. cities — also 6 Canadian cities.



EXCLUSIVE FOXBORO REFINEMENTS

- Segmental Lever Transmission gives *truly* straight-line calibration.
- Extra-large Float with long travel gives extra power.
- Sure-Seal Check Valves, submerged in mercury, positively prevent mercury losses from overrange.
- Pressur-Tite Frictionless Bearing eliminates stuffing box and packing.

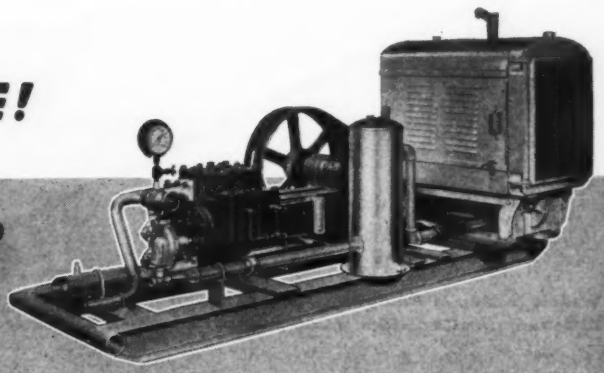
FOXBORO REG. U. S. PAT. OFF.

DIFFERENTIAL-TYPE FLOW METERS

Service... follow-through

It's a smart buyer who looks beyond the purchase of a pump—investigates carefully the long-range service policy of the manufacturer. Gaso welcomes such an investigation. We maintain stocks of parts for all standard Gaso models ever made—with a rule of shipping by fastest route on the day the order is received.

SAY GASO AND BE SURE!



GASO PUMPS

for every oil industry need

GASO PUMP & BURNER MFG. CO. 902 EAST FIRST ST., TULSA, OKLA.
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Shreveport: W. L. SOMNER CO., 419 Lake Street • Los Angeles: 2529 Chambers St., Vernon • Western Canada: Lufkin Machine Co., Ltd., Edmonton, Alberta

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You can protect several danger spots at one time with a Kidde built-in carbon dioxide fire extinguishing system. ¶ Widely separated fire hazards... even on different floors can be protected by a single Kidde system. If fire strikes a protected space, directional valves rush fire-smothering carbon dioxide gas to the stricken area. The same CO_2 can set off mechanisms to shut doors and windows... turn off fans and machinery. After doing its job, the clean, dry CO_2 evaporates completely. ¶ Whatever your fire detection and protection problem may be, a Kidde expert will be glad to help. When you think of CO_2 call Kidde.

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Job-prepared . . .

IDEAL ROTARY SWIVELS

Hang your new "Ideal" Swivel right on the hook as soon as you get it . . . it reaches you ready to go to work, whether you're down 500 or 5,000 feet. No need to run-in or pamper a new "Ideal" Swivel.

The "Ideal" main bearings, heart of the "Ideal" Swivel, are factory-lapped-in under load. Then the assembled swivel is factory-run-in under simulated load conditions.

These precautions, along with tailor-made "Ideal" electric steel, make sure you'll get a bonus of drilling hours from an "Ideal" Swivel.

Bulletins describing "Ideal" Swivels in sizes for shallow, medium, deep, and deepest wells will be sent to you on request. Or ask your local National Supply store.

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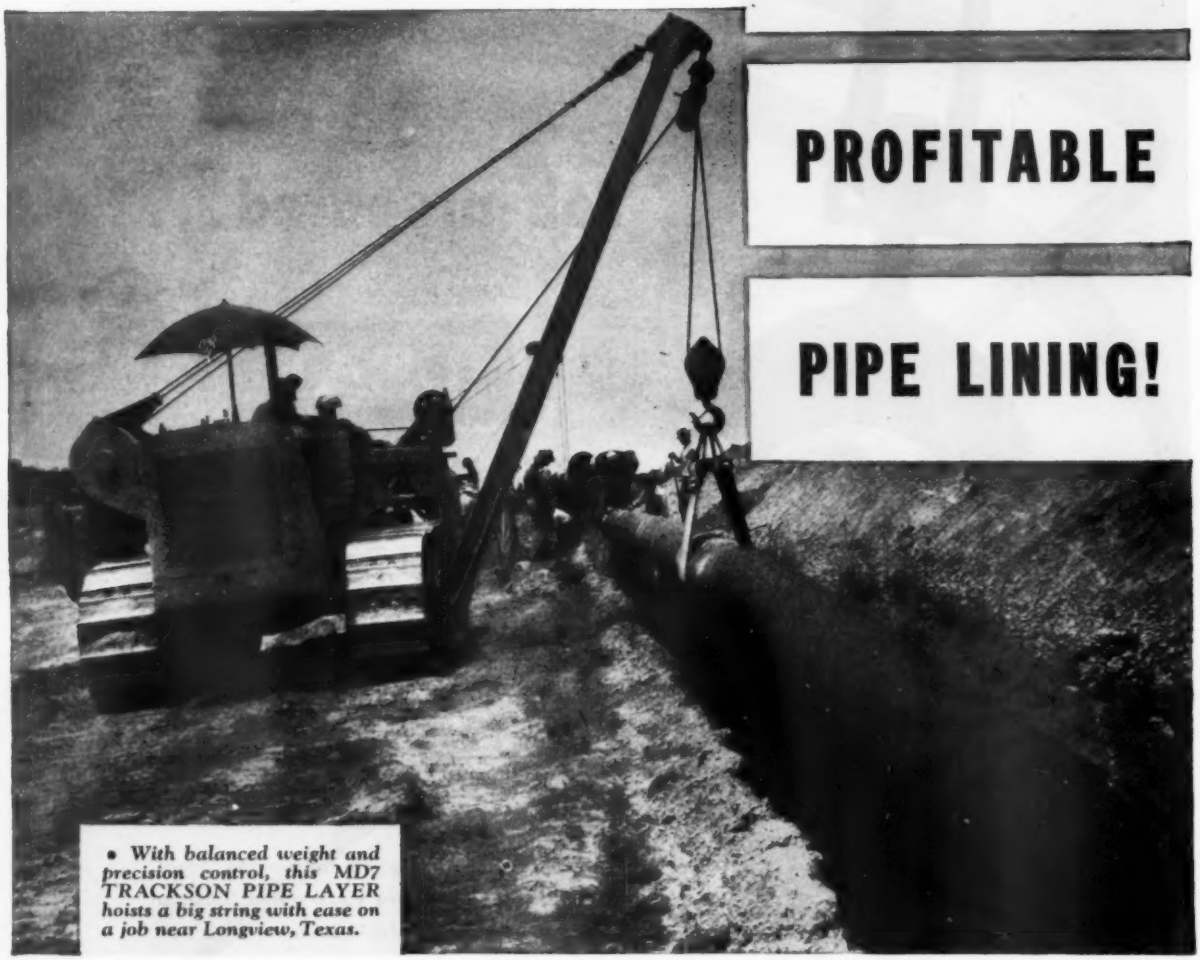
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT . . . SPANG PIPE . . . SUPERIOR & ATLAS ENGINES

TRACKSON PIPE LAYERS... POWER FOR PROFITABLE PIPE LINING!



• *With balanced weight and precision control, this MD7 TRACKSON PIPE LAYER hoists a big string with ease on a job near Longview, Texas.*

Big-Inch or Little-Inch . . . Pipe Lines go down faster — more profitably — with TRACKSON PIPE LAYERS on the job! These husky machines — powered by dependable matching "Caterpillar" Diesel Tractors — go for rough country and tough jobs . . . handle them all in stride.

Big power—delivered through the time-proved TRACKSON Transmission—gives these PIPE LAYERS power, speed and control for fast, profitable stringing—from unloading to spotting line pipe. TRACKSON PIPE LAYERS speed-up and simplify tieing-in with their precision lifting — steady holding abilities.

Dope gangs like TRACKSON PIPE LAYERS for their brute strength and the solid, sure support of their rigs. Lowering-in calls for the unobstructed operator's view, accurate, precision control and powerful lift of these PIPE LAYERS which assure safe placement of pipe intact.

Your TRACKSON-"Caterpillar" Dealer can give you more details on this Power for Profitable Pipe Lining — one of the five models in the TRACKSON PIPE LAYER line will fill your needs. Call on him today . . . or write TRACKSON COMPANY, Dept. OG-31, Milwaukee 1, Wisconsin.

TRACKSON® ***TRACTOR EQUIPMENT***

IT ALWAYS PAYS TO SPECIFY

LADISH

Controlled Quality

PIPE FITTINGS

...When you judge by Operating Statements

Maximum strength and endurance to minimize shutdown losses and replacement costs... these are important operating economies you can trace directly to the laboratory safeguards of Ladish Controlled Quality. Advanced metallurgical controls over materials and forging methods assure complete dependability in every Ladish fitting.

TO MARK PROGRESS

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF...ONE RESPONSIBILITY

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CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
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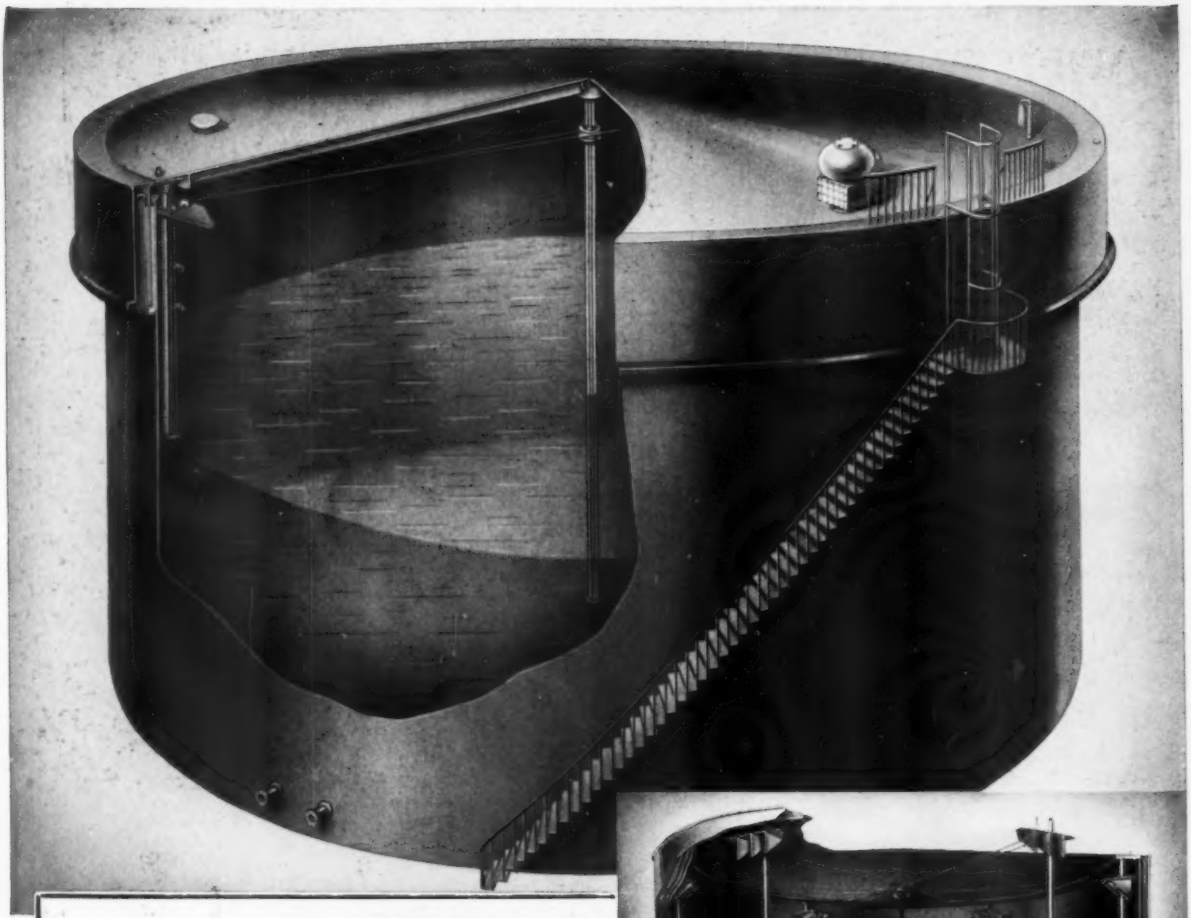
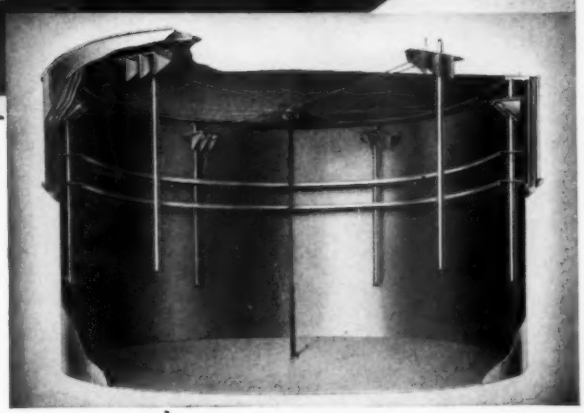


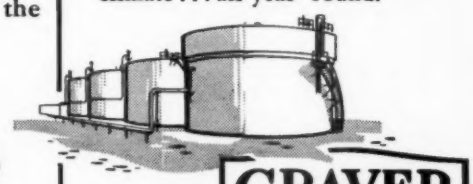
INSIDE STORY

ON VAPOR-SAVING WITH THE GRAVER EXPANSION ROOF



Cut-away for your inspection is this Graver Expansion Roof Tank. Here you see the details of its operation which dependably conserves the volatile elements of gasoline . . . so critically important today! This Graver design—approved by Underwriters' Laboratories—has a record of unfailing operation throughout the petroleum industry during the decade since it was first introduced.

Inset above shows mechanism by which *all-weather* stability is attained in the Graver Expansion Roof. The functional perfection of this design keeps *Conservation at Work* day and night in any climate . . . all year 'round.



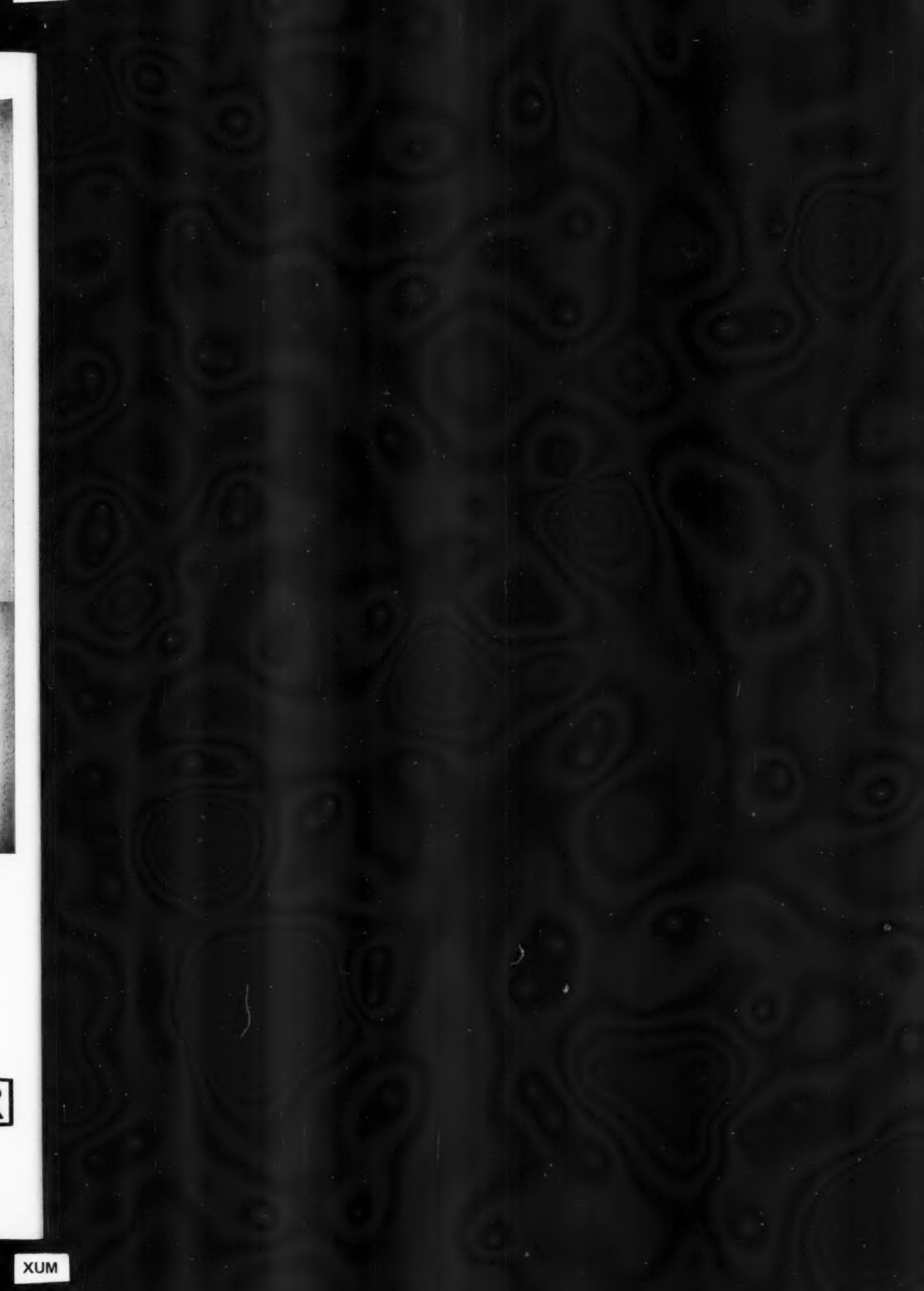
FABRICATED PLATE DIVISION

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • CHICAGO • PHILADELPHIA • WASHINGTON
DETROIT • CINCINNATI • HOUSTON
CATASAUQUA, PA. • SAND SPRINGS, OKLA.

GRAVER



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Complete Stocks

WHEREVER THERE IS OIL!

WHEREVER THERE IS OIL, you will find *Texrope* dealers, ready to supply single and multiple V-belts, standard and variable-speed sheaves. Stocks for quick replacement are available at dealers in the oil field locations shown at the right.

DEPENDABILITY

Texrope drives using the popular *Magic-Grip* sheaves are inherently easy, quick, and economical to install as compared to other types of power transmission equipment.

And it's a good idea to team *Texrope* V-belts with *Magic-Grip* sheaves. The belts are engineered and manufactured to exacting standards. Every one is carefully weighed and inspected during construction . . . precision molded and cured in accurate steel dies. Belts have straight sides necessary for gripping action.

Get everything you need in V-belt drives from one reliable source. For complete Allis-Chalmers V-belt information, call your nearby *Texrope* dealer, or write Allis-Chalmers, Milwaukee 1, Wis.

A-3110

Texrope and Magic-Grip are Allis-Chalmers trademarks.

Genuine *Texrope* V-belts and Drives are available through dealers in any of these cities.

ARKANSAS
Magnolia

CALIFORNIA
Los Angeles

KANSAS
Great Bend
Plainville
Wichita

LOUISIANA
Houma
Lake Charles
New Orleans
New Iberia
Shreveport

MISSISSIPPI
Brookhaven
Laurel
Natchez

NEW MEXICO
Eunice
Hobbs

OKLAHOMA
Duncan
Edmond
Oklahoma City
Pauls Valley
Tulsa
Elk City
Ardmore

TEXAS
Abilene
Bowie
Dallas
Falfurrias
Fort Worth
Fullerton
Gainsville
Houston
Kermit
Kilgore
Odessa
Refugio
San Antonio
Snyder
Sundown
Wichita Falls
Midland
San Angelo
Breckenridge

WYOMING
Casper

NEW YORK
New York City

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

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DOWN-TO-EARTH *experience..*

SINCE 1932 Independent has had from two to eighteen crews in the field at all times... operating from the swamps of Louisiana to the Rocky Mountains, in coastal tidewaters, tropical jungles, and on desert sands.

The down-to-earth experience gained through successfully overcoming special problems and adverse conditions provides the "know how" that gets every job done efficiently and makes Independent's service profitable to our clients. You are invited to consult with us about your exploration program.

D. D. Doty has been working up through the Independent organization for 18 years. Now a senior party chief, his service is typical of the extensive geophysical experience of all key personnel at Independent Exploration Co.

POINTING THE WAY IXC FOR THE DRILL

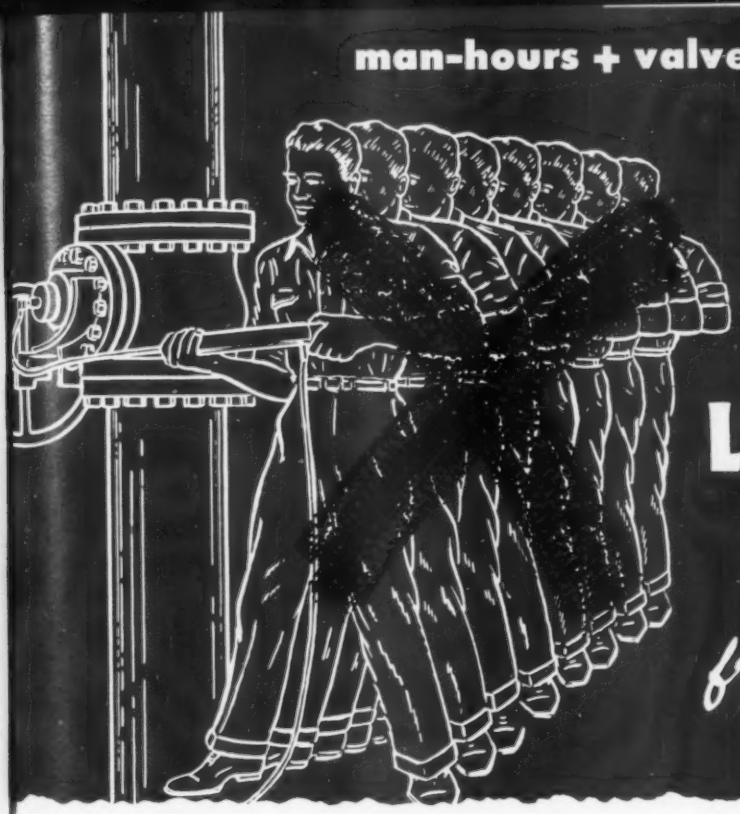
Independent *Geophysical Surveys*

EXPLORATION COMPANY

1973 WEST GRAY ★ HOUSTON, TEXAS

ESTABLISHED 1932

man-hours + valve grease = high upkeep



Cut VALVE LUBRICATION EXPENSE from your overhead

Cameron NON-LUBRICATED LIFT-PLUG VALVES

Easy Operation . . . almost effortless opening and closing under full rated pressure with less than one full turn of a lever . . . without lubricant on the plug and seat. Tight Sealing . . . the higher the pressure the tighter the seal . . . and no lubricant is required.

No danger of contaminating line products with valve grease. No danger of valve failure due to lack of periodic lubricant maintenance. No danger of clogging metering equipment with valve lubricants.

The Cameron Non-Lubricated Lift Plug Valve is truly remarkable. Its separate, replaceable seat is a distinctive feature. Changing the valve seat requires no skill or special tools, and the valve need not be removed from the line. Seats and plugs are available in specification materials for special services.

Try a few of these great new valves in your plant, on your Christmas trees, gathering lines, or in any difficult service where you can obtain first hand information on their performance.

Cutaway view, showing plug actuator which lifts, turns and seats plug in ¾-turn of the operating lever.

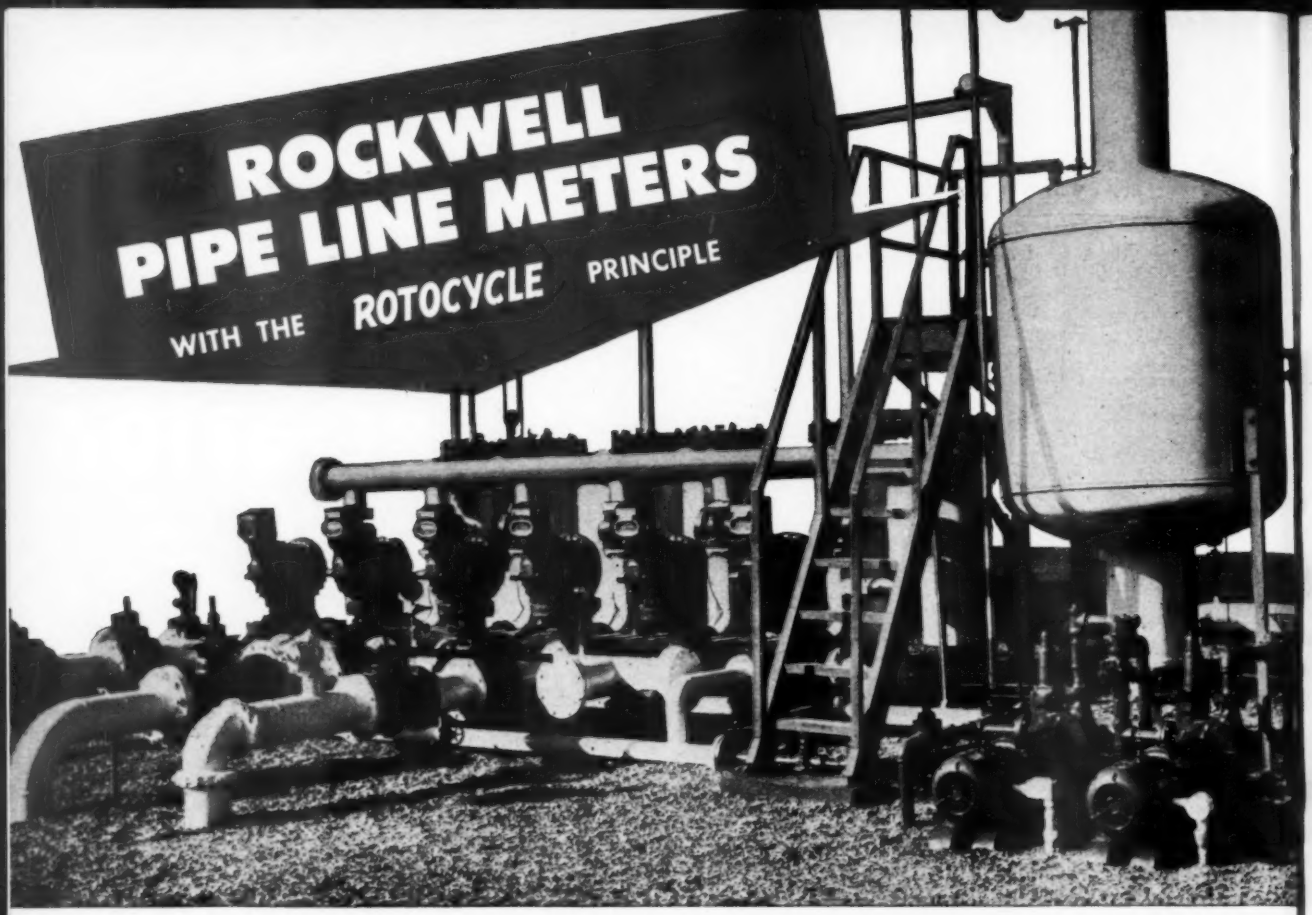
Renewable seat permits any desired trim for any special service; also facilitates field repair and minimizes maintenance.

CAMERON IRON WORKS, INC.

P. O. BOX 1212 • HOUSTON, TEXAS

Export: 74 Trinity Place, New York

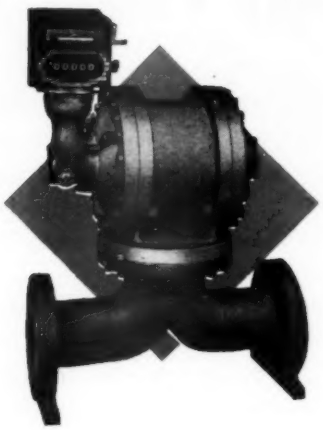
WAREHOUSE STOCKS ARE CARRIED AT:
Corpus Christi, Odessa, and Snyder, Texas; Long Beach, California, and Casper, Wyoming.



PAY OFF *where you take off!*

When you guard your take-offs with Rockwell Rotocycle meters you protect your pay-off points in two ways. First you gain the mechanical advantages of a proved meter design that has rolled up impressive durability records on the nation's leading pipe lines. Second you are assured of precision accuracy that accounts for every drop of throughput and every penny of return.

Rockwell Rotocycle meters are made in five sizes for either high or low pressure service and may be optionally fitted with temperature compensators, straight reading or printing registers. Write for bulletins and case histories of actual operator's experience.



Model 6 PL Rockwell Rotocycle with printing register. Capacity 1150 barrels per hour.

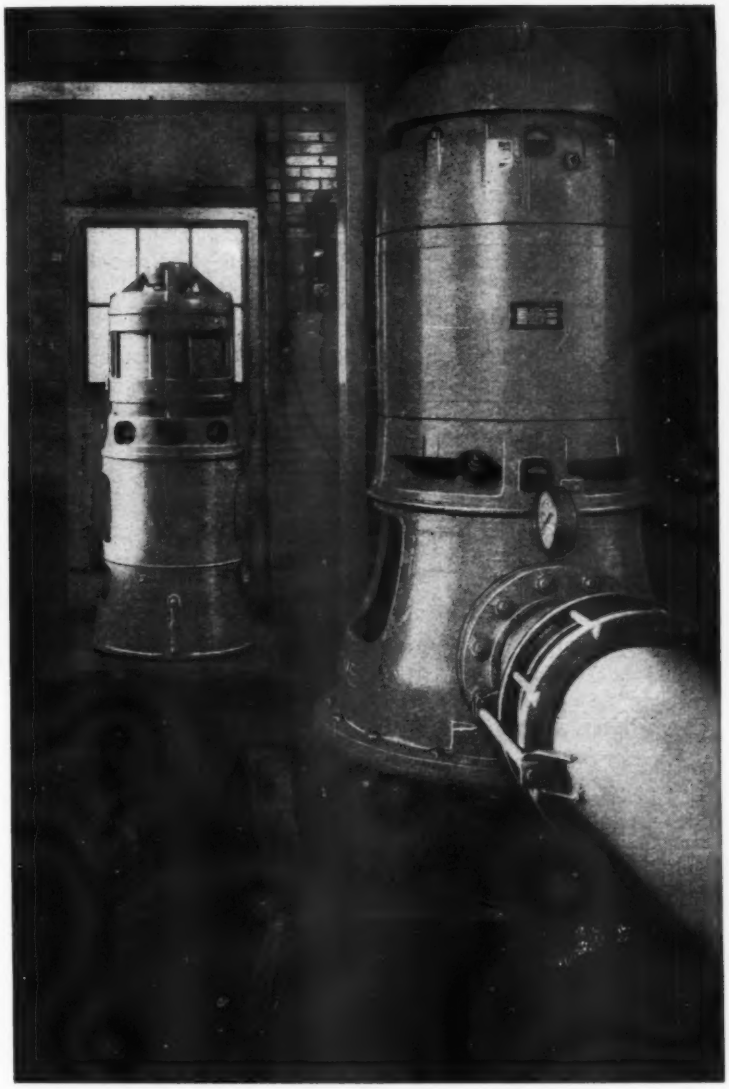
Rockwell MANUFACTURING COMPANY
PITTSBURGH 8, PA.

Atlanta Boston Chicago Columbus Houston Kansas City
Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

ROCKWELL

BEATRICE, NEBRASKA UPS WATER SUPPLY

WITH A LAYNE SHORT SETTING BOOSTER PUMP



The above Layne Well Unit (in background), driven by a 60 H.P. solid shaft motor, was installed in 1931 and has been operating efficiently for almost twenty years.

FROM four Layne Well Water Units, Beatrice, Nebraska was putting 1600 gallons of water per minute into the city through their six miles of 14 inch mains. Growth of population and new industries created a need for more. The problem was easily, quickly and economically solved by installing a Layne Short Setting Booster Pump in line with the wells. As a result, water supply was increased to 2,380 gallons per minute—nearly 41 percent.

The Layne 2-stage, 15 inch bowl booster pump, powered with a 100 H.P. motor was easily accommodated in a small pump house addition, thus saving the cost of extra heating equipment. Installed in 1948, it is giving highly satisfactory service.

These Layne Short Setting booster pumps may be used by other cities—and factories as a means of increasing water supply at a very nominal cost.

If you are in need of more water either from your present wells, or from new units, Layne engineers will gladly survey your present equipment and make dependable recommendations. For further information, catalogs, etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

Layne

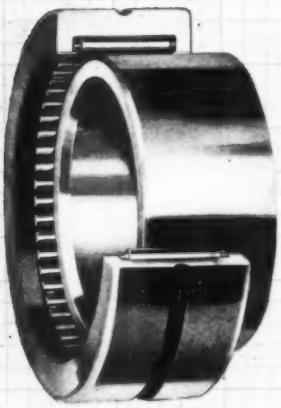
WELL WATER SYSTEMS
VERTICAL *Turbine* PUMPS

LAYNE ASSOCIATED COMPANIES

ASSOCIATED COMPANIES—Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F. ★ General Filter Company, Ames, Iowa.

giant NATIONAL pumper

...Torrington Bearing-equipped

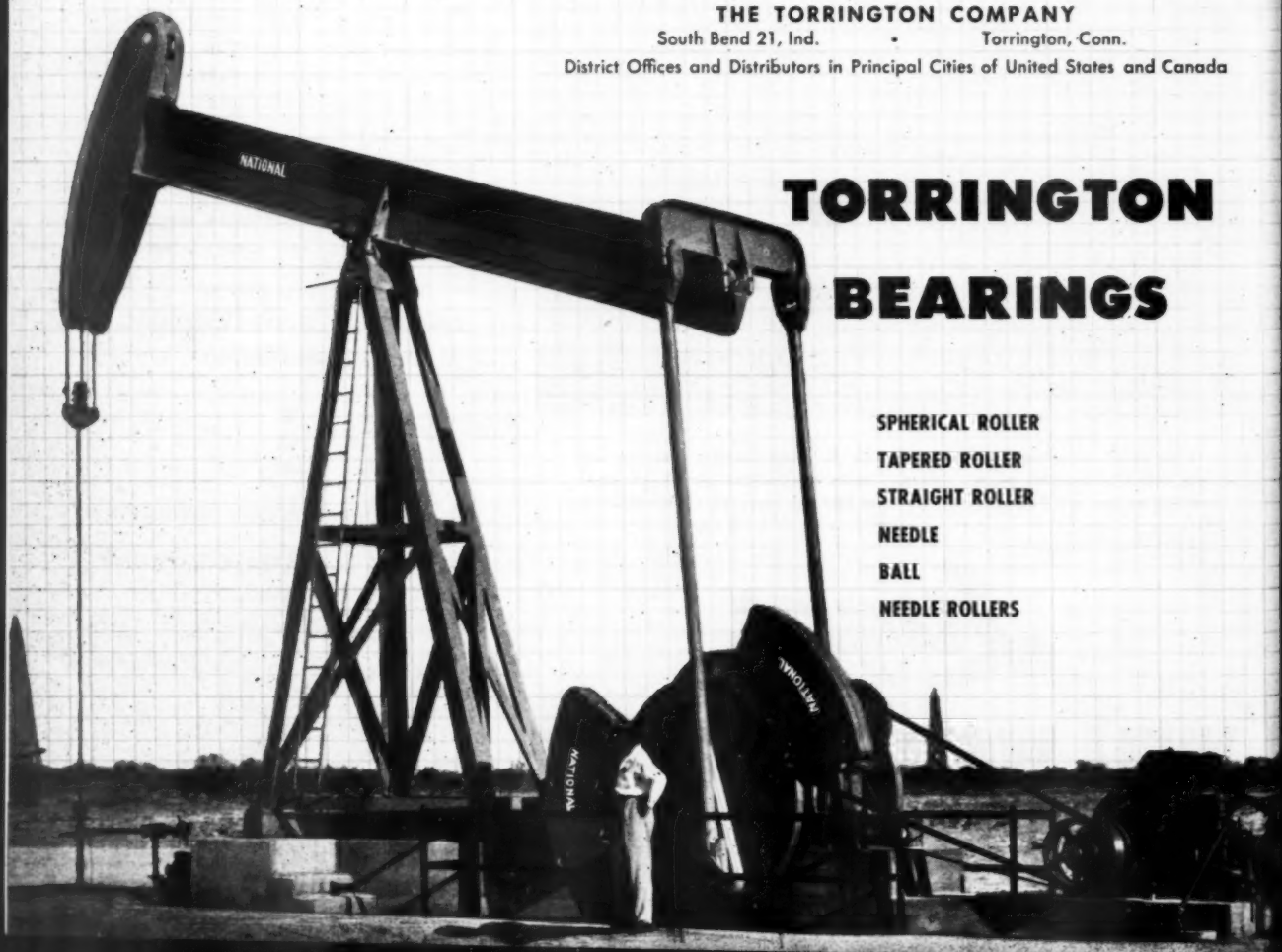


The Torrington Type NCS Needle Bearings in this mammoth National Supply Company Pumper were specified to achieve the walking beam API load rating of 32,400 pounds.

The full complement of rollers in Type NCS Needle Bearings provides high capacity and helps distribute lubricant evenly over all bearing surfaces. Type NCS Needle Bearings simplify design and assembly of saddle and pitman bearing units.

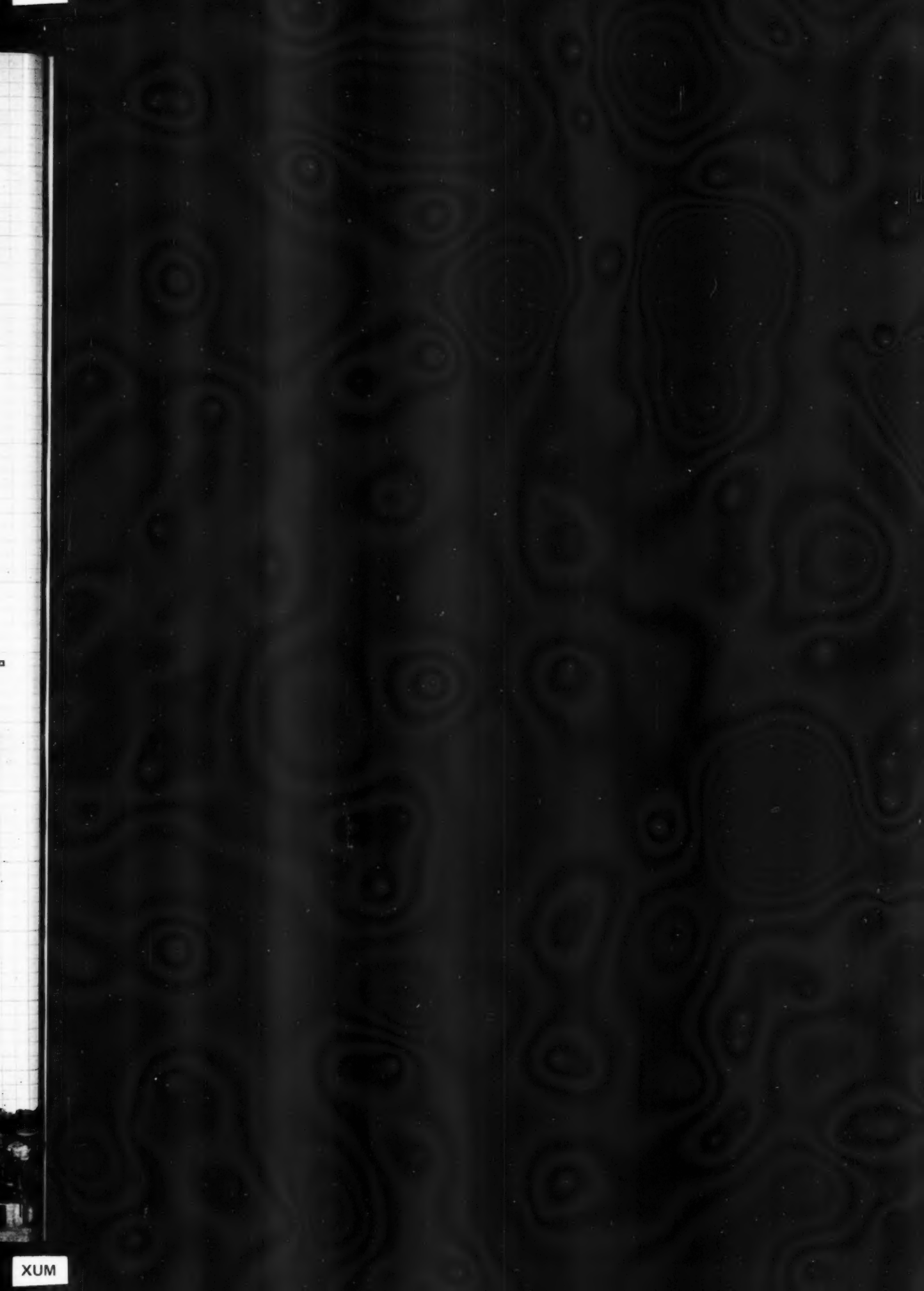
If you're looking for top efficiency in your products, investigate the advantages of these and other Torrington Bearings. Our engineers will be glad to help you.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District Offices and Distributors in Principal Cities of United States and Canada



TORRINGTON BEARINGS

SPHERICAL ROLLER
TAPERED ROLLER
STRAIGHT ROLLER
NEEDLE
BALL
NEEDLE ROLLERS



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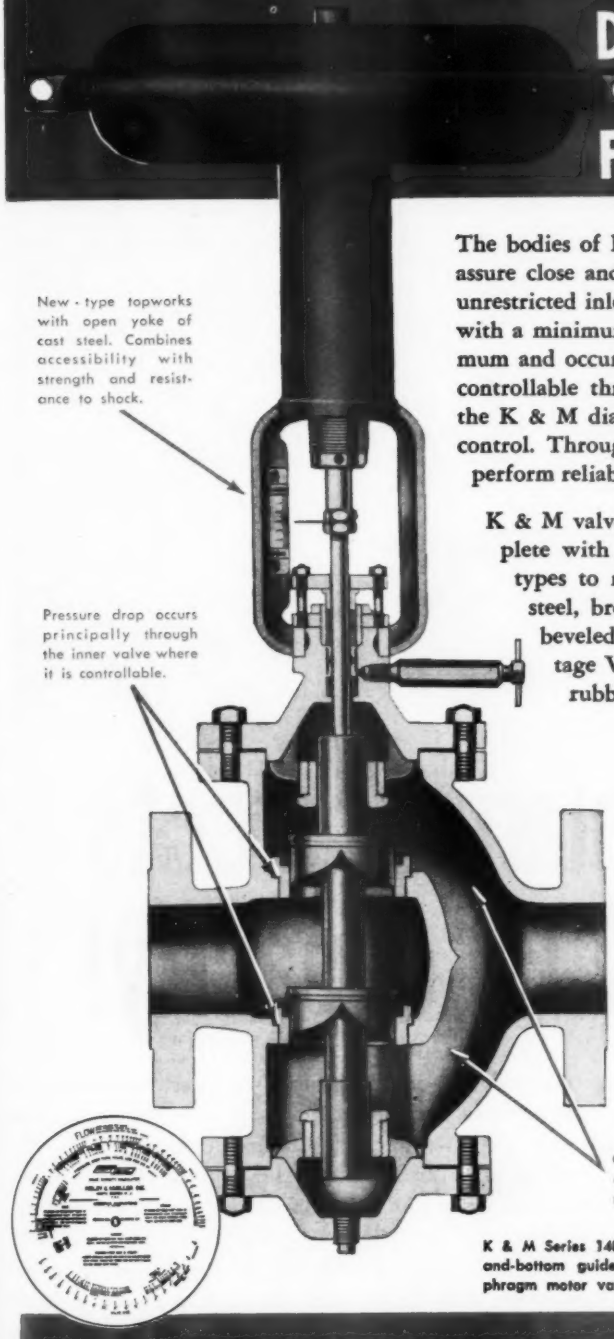
The Control Valves DESIGNED ESPECIALLY FOR INSTRUMENTATION



New - type topworks with open yoke of cast steel. Combines accessibility with strength and resistance to shock.

Pressure drop occurs principally through the inner valve where it is controllable.

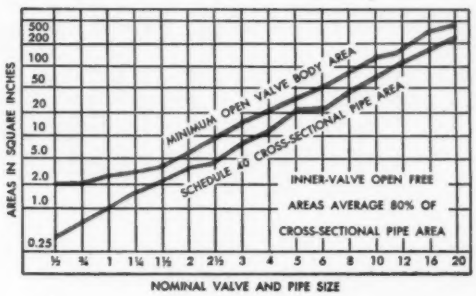
Over-size, streamlined body areas reduce turbulence and friction to a minimum and assure smooth, maximum flow.

K & M Series 1400 top-and-bottom guided diaphragm motor valve.

The bodies of K & M Control Valves are especially designed to assure close and positive control by instrumentation. They have unrestricted inlet and discharge passages and permit smooth flow with a minimum of turbulence. Pressure drop is held to a minimum and occurs principally through the inner valve where it is controllable through the full valve travel. The construction of the K & M diaphragm motors assures extreme precision in this control. Throughout, K & M Control Valves are engineered to perform reliably in *the most exacting applications.*

K & M valves are available in sizes from ½ to 20-inch, complete with diaphragm motor and are made in 13 different types to meet varying requirements. Constructed of semi-steel, bronze, cast steel or special alloys. Inner valves in beveled quick opening, percentage parabolic or percentage V-port design as standard. Facings range from soft rubber to stellite.

Because of their modern design, all K & M valve bodies have extremely high capacities in relation to corresponding pipe size:



This extremely accurate circular slide-rule type K & M valve capacity calculator includes correction scales for steam quality, liquid and gas specific gravity and a flowing temperature scale for gases. Sent without charge in response to a request on your business stationery.

KIELEY & MUELLER

Established 1879

2027 43rd Street North Bergen, N. J.

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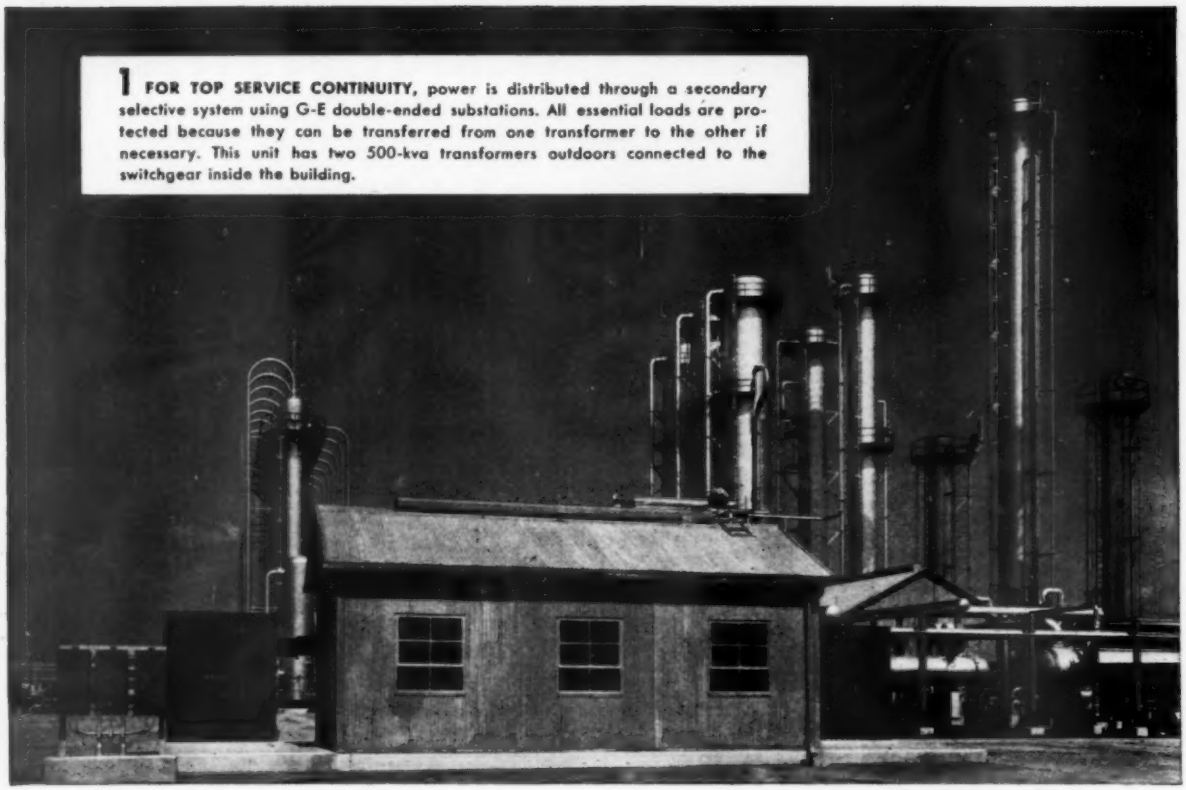
A PHOTO-REPORT ON MODERN


1 FOR TOP SERVICE CONTINUITY, power is distributed through a secondary selective system using G-E double-ended substations. All essential loads are protected because they can be transferred from one transformer to the other if necessary. This unit has two 500-kva transformers outdoors connected to the switchgear inside the building.

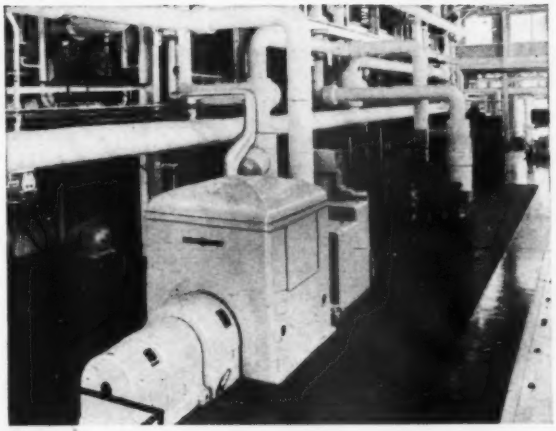
Gas cycling plant protects its ½-billion-CFD capacity!

Uses General Electric equipment—including double-ended unit substations in secondary selective arrangement—to maintain high service continuity

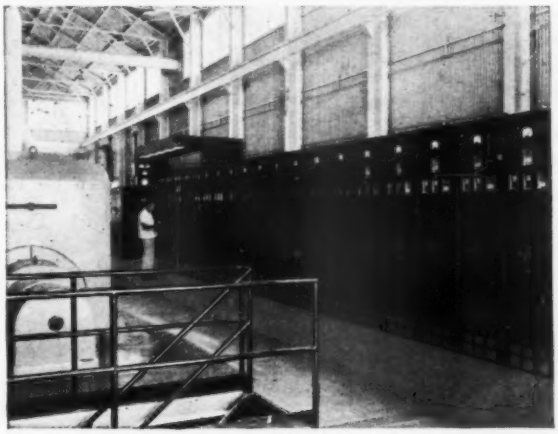
Stripping condensible by-products from "wet" gas, compressing it as "dry" natural gas, and injecting it back into the production formation, calls for power-system reliability—especially when it's done at a rate of 500 million cubic feet per day! To help safeguard production continuity in key areas at this large Gulf Coast cycling plant near Katy, Texas, reliable General Electric equipment is used. It will pay you to look to General Electric for all *your* refinery's electric equipment, plus skilled engineers to help apply it most economically. Ask your local G-E representative for the full story —soon. *Apparatus Dept., General Electric Company, Schenectady 5, N.Y.*

GENERAL ELECTRIC

661-26



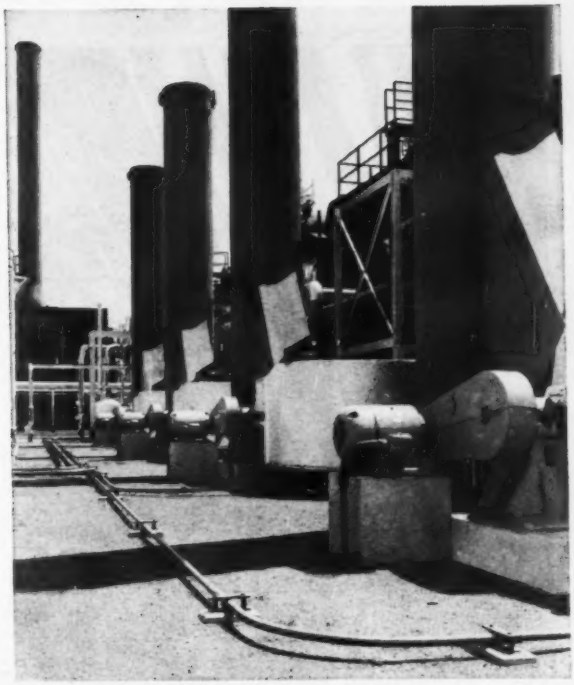
2 **DEPENDABLE POWER GENERATION** is provided by these two G-E turbine-generator sets, each rated 2500 kw, 4160 volts, with top-mounted generator coolers. The 6-stage turbines are rated 600 psig, 700 degrees F, 265 psig back pressure. G-E turbine-generators, designed for reliable operation, give maximum output per dollar of fuel cost.



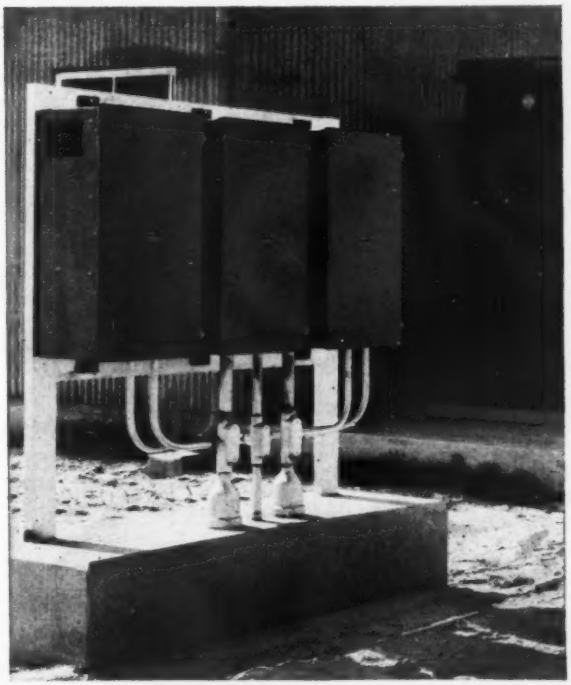
3 **COMPLETE CONTROL** of plant-generated power is supplied by this G-E 4160-volt metal-clad switchgear. Deadfront metal enclosures protect operating personnel. Circuit breakers—of adequate interrupting capacity for the plant's needs—are easily removable to simplify maintenance. Units are shipped assembled, ready for easy installation.

*Reg. Trade-mark of General Electric Co.

Co-ordinated ELECTRIC EQUIPMENT for Gas Cycling and Repressuring



4 **3-WAY EXTRA PROTECTION** against physical damage, electrical breakdown, and operating wear and tear is built into these four G-E Tri-Clad* totally enclosed fan-cooled motors driving outdoor boiler fans in the Katy plant. Rated 75 hp, 440 volts, 1200 rpm, they have corrosion-resistant cast-iron enclosures to withstand acids, alkalis and solvents.



5 **TO PREVENT CORROSION** of piping, G-E rectifiers are used for cathodic protection. Giving longer life, lower maintenance costs, and reduced shutdown time, G-E selenium rectifiers incorporate corrosion-resistant, oil-immersed stacks which are hermetically sealed against contamination by moisture or fumes in the air.

Rotary Hose Features

...never known before!

In Two Great New U. S. RUBBER Products

U. S. ROYAL 4 —first rotary hose ever to offer these great advantages—

Double Reinforcing Wire Units —Royal 4 incorporates 2 double wire layers (4 stress wires in all) to a unit—each layer a hose in itself with sufficient hydrostatic value to resist bursting.

Highest Working Pressure —rules out the "burst" risk taken when conventional hose operates on the modern high-pressure pumps of today . . . eliminates costly switching to steel hose when high pump pressures are required.

Ultra-Flexibility —subjected to torturous factory "sling" tests, Royal 4—due to its special wire-reinforced, fabric-and-rubber construction—has demonstrated a degree of flexibility unparalleled in rotary hose history.

Complete Kink Resistance —with extreme flexibility from leakproof coupling to leakproof coupling, Royal 4 resists all forms of kinking even on mast type rigs.

Record Trouble-Free Test Performances —after two long and rigorous test years in the deepest fields of Texas, Louisiana and Oklahoma...under the highest pressures of off-shore Gulf Coast drilling...U. S. Royal 4—in varying service lengths fitted to every type of rig—has come through without a failure.

U. S. MATCHLESS CABLE-LAY —new and vastly improved with qualities no other Cable-Reinforcing hose possesses—

Twist-Free Cable Construction —its 19-strand cable wire of highest tensile steel is so arranged as to completely eliminate the characteristic twisting of wire under stress.

Unique Failure-Proof Carcass —a special, soft, pliable yet super-strong cotton fabric overcomes the incidence of carcass failure so frequent in most flexible hose.

Complete Kink Resistance —Like U. S. Royal 4, ultra-flexible U. S. Matchless Cable-Lay with its built-in, leakproof couplings makes for a super-effective kink-resistant working length.

Extended Flex Life —with its special long-lasting carcass and twist-free cable strands in rubber-cushioned plies, U.S. Matchless Cable-Lay guarantees an appreciably longer flex life.

Product of Exhaustive Experimentation —thousands of tests involving wire sizes, strand numbers and degrees of flexibility preceded the making of U. S. Matchless Cable-Lay. Now—in answer to oilmen's demands for a better Cable-Reinforced hose—it is ready to add miles of drilled footage to service life.

Expert advice and service on the job are yours for the asking. See your "U. S." Distributor about these great new hose or write...

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • Rockefeller Center, New York 20, N. Y.

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R·P&C VALVES

NO. **1050**
Stainless
Steel
Bar Stock
Valve

R-P&C Bar Stock Valves are an achievement of the valve makers' craft. They are precision turned . . . from carefully tested metals . . . and suitable for a wide range of pressures and temperatures . . . for meter, gauge, test, and general purposes.

Rugged construction of R-P&C Bar Stock Valves means long, low-cost, trouble-free service. No better bar stock valves are made. See your R-P&C distributor today or write the nearest R-P&C district office for information.

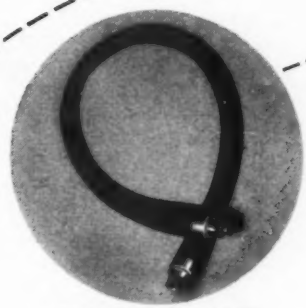
ACCO

R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

"Intentionally Better"
READING-PRATT & CADY VALVES

STEAM HOSE

Toss it around. Use it rough. Republic Steam Hose is built for punishment! It's easy to handle, it's safe under highest pressures; always ready for duty. All standard sizes available in lengths up to 50 ft.



ROTARY DRILL HOSE

No bolts or protrusions of any kind to catch on the rigging! Republic's Champion Rotary Drill Hose is made with the new, Patented Boltless Coupling, streamlined to the shape of the hose and locked in leakproof union by a special hydraulic seal. Built-in steel muscles protect the oil-resistant Reprene hose from distortion. There are three types of Champion Hose tested for 3000, 4000 or 5000 psi. Supplied in standard lengths up to 55 ft.

Try Republic First

FOR RUBBER PRODUCTS BUILT TO OIL FIELD SPECIFICATIONS

MUD PUMP HOSE

Flexible, smooth bore suction hose with internal, spiraled steel reinforcements and a tube and cover that'd almost take a diamond to cut!

When it comes to the rough and tumble, Republic Rubber products stand on their own feet.

That goes for hose, belting, packing . . . any and all of the many items that Republic makes especially for oil field service.

Republic Rubber products are easier to handle, they're stronger, safer and more economical. So don't delay. Get in touch with the Republic Distributor nearest you soon. He's had lots of experience matching specific products to individual jobs like yours and we're betting he can come up with the right answer for you.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

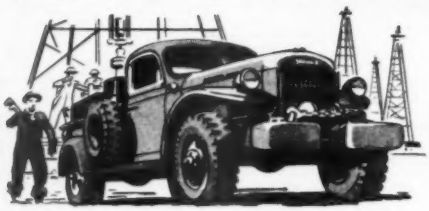
MID-CONTINENT DISTRIBUTORS

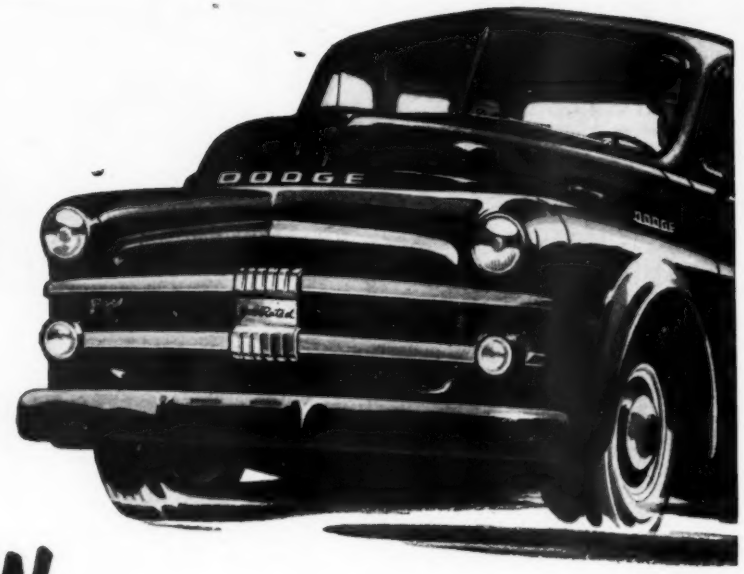
Jones & Laughlin Supply Co., Tulsa. Okla.
The Bovaird Supply Co., Tulsa, Okla.

WEST COAST DISTRIBUTORS

W. C. Hendrie & Co., Inc., 405 Towne Ave., Los Angeles, Calif.
Pacific Rubber Co., 51 Main St., San Francisco, Calif.

"Job-Rated" for OIL MEN





Brand new DODGE "Job-Rated" TRUCKS

The trucks that do the most for you!

More than 50 BRAND-NEW improvements . . . including

NEW! SMOOTHER RIDE with new, "Oriflow" shock absorbers—standard equipment on ½-, ¾-, and 1-ton models.

NEW! EASIER LOADING with lower ground-to-floor height—on all models through 2 tons.

NEW! EASIER BAD-WEATHER STARTING with new moistureproof ignition and high-torque starting motor.

NEW! MORE ECONOMICAL PERFORMANCE with higher (7.0 to 1) compression ratio—on all models through 1 ton.

NEW! SMOOTHER ENGINE IDLING with "hotter" spark plugs; on all models through 1 ton.

BRAND-NEW POWER—You get more power than ever—engineered for *your* job! Eight great engines—with net horsepower stepped up as much as 20%! You get more of the *right* power for your needs—with top economy! Yet, with all their extra value, new Dodge *"Job-Rated"* trucks are priced with the lowest.

BRAND-NEW EASE-OF-HANDLING—You can turn new Dodge *"Job-Rated"* trucks sharper . . . maneuver them more easily. New shorter turning diameters! New worm-and-roller steering gears! All this—plus cross-steering, wide front tread and short wheelbase.

BRAND-NEW BRAKING SAFETY—New Dodge *"Job-Rated"* trucks are the trucks with new molded, tapered Cyclebond brake linings! New *extra-quiet* action! New extra-smooth, extra-sure stopping! New longer lining life! (On new 1½-ton and up trucks, except air brake models.)

PLUS THIS EXCLUSIVE! gyrol Fluid Drive available on ½-, ¾-, and 1-ton, and Route-Van trucks.

See your Dodge Dealer today for

THE TRUCK THAT FITS YOUR JOB... A DODGE Job-Rated TRUCK

XUM

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AXELSON QUALITY

IS PROVED

AT THE BOTTOM

OF THE WELL

THE WORKING COMBINATION of Axelson Deep Well Pump Plungers and Axelson Duax Liners delivers more oil at less lifting cost with less down time . . . proved throughout Axelson's almost 60 years of service to the petroleum industry.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

ASK AN AXELSON EXPERT

AXELSON

First Choice

AXELSON MANUFACTURING CO. • PLANTS – Los Angeles 58; St. Louis 16 • OFFICES – New York City 7; Tulsa 1, Buenos Aires, Argentina; Caracas, Venezuela • DISTRIBUTORS – Jones & Laughlin Supply Co., Great Northern Tool & Supply Co., Industrial Agencies, Ltd., San Fernando, Trinidad, B. W. I., Industrias Waldrip & Campbell, Barcelona & Maracaibo, Venezuela, Dominion Oil Field Supply Co., Ltd., Calgary, Canada; South American Supply Co., Avenida Tacna 592, Lima, Peru.

XUM

FASTER.. ..MORE EFFECTIVE FIRE CONTROL

WITH THE ANSUL Stream Pattern

..plus BETTER HEAT-SHIELD PROTECTION

Exclusive Features

- Water-tight construction.
- Provides a modified cone-shaped stream pattern without hole in the center of the stream.
- Each nozzle gas pressure tested after assembly.
- Special spring loaded packing to insure lasting water-tightness.
- Designed for use by inexperienced operators.
- Low velocity, more effective stream of dry chemical.

Why Advertise the Nozzle! . . . .

. . . . because the **nozzle** on your ANSUL Dry Chemical Fire Extinguisher is **water-tight** . . . it **won't** become inoperative due to corrosion or caking of dry chemical within the working parts . . . the most inexperienced man in your plant **can use the ANSUL extinguisher effectively . . . and only Ansul has a nozzle** to meet all of these requirements!

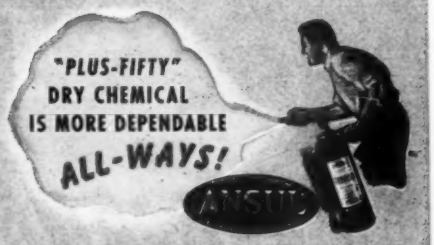
If your hazards require special long range straight stream nozzles, you can get Ansul Extinguishers equipped with these nozzles at no extra cost. With Ansul Dry Chemical Fire Extinguishing Equipment you have not only the best fire protection but also a choice of models and designs to meet your requirements.

Send for File No. 655. You will receive our latest catalog, a Periodic Inspection Record Chart, "Fundamentals of Fire Extinguishment" and information about Ansul Dry Chemical Piped Systems for automatic protection.

ANSUL

CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION
MARINETTE • WISCONSIN

DISTRIBUTORS
IN ALL PRINCIPAL CITIES IN THE U.S.A., CANADA AND OTHER COUNTRIES



THIS TRADE MARK ASSURES YOU OF QUALITY PRODUCTS

They Say—

Oil Supply vs. Controls

"The effects of 4 years of severe restrictions (during World War II) on the industry's operations are a matter of official record. The nation's crude-oil-producing capacity, which had been increasing steadily and which was ample prior to the last war, decreased by 177,000 bbl. daily from 1941 to 1945. At the same time, the competitive position of independent producers was weakened as evidenced by the fact that 30 of the larger companies increased their total share of the domestic output from 53.6 per cent to 62.9 per cent.

"There is only one possible explanation for these unsound trends. Unrealistic price policies, inadequate materials and manpower, and the creeping paralysis that automatically comes with centralized controls brought this country to the verge of a crisis in oil supply. . . .

"In contrast to the experience of the war years, exploration, development, and producing activities expanded greatly during the past 5 years. . . . The multiple effort of thousands of individual operators, free of restrictive government control or direction, was the underlying force that reduced undiscovered oil reserves to producing oil wells. . . .

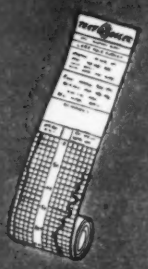
"The petroleum that this country must have for continued strength and security depends in the first instance, of course, upon what nature has stored in underground formations. It depends far more, however, upon your freedom to continue to search for and make available these sources of supply. . . ."

Minor S. Jameson, Jr., assistant to the president, Independent Petroleum Association of America.

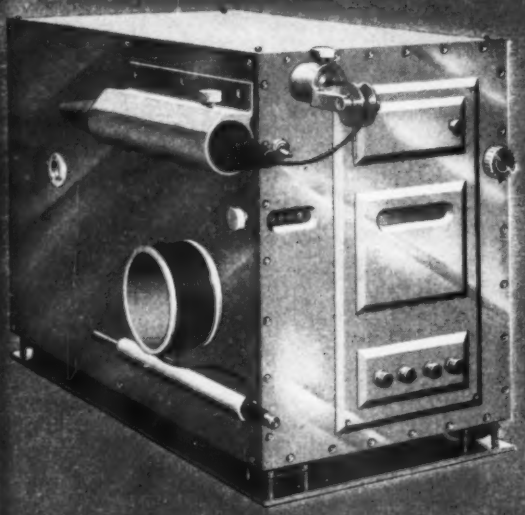
Better Under One Roof

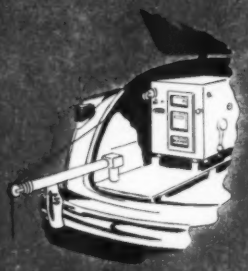
"Now there's one thing about oil that we ought to get straight right now. It's different from any other product. Black, sticky, bulky—you can't store more than a few weeks' supply of it. It must be kept flowing from the earth through channels to the tanks of your cars. Consequently petroleum supplies must be as carefully scheduled as high-speed trains on split-second runs. Crude oil and finished oil products must flow continuously and with virtually no margin to spare.

"The many and diverse operations of the oil industry, such as refining, transportation, and marketing are closely interrelated, delicately balanced, and utilize many specialized facilities. Changes or adjustments in

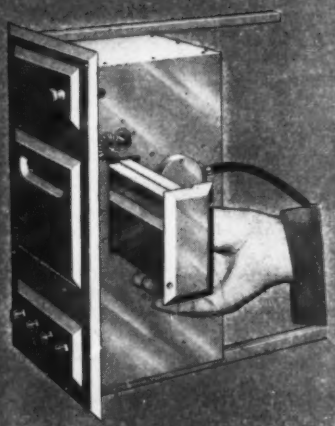


A self-potential and a resistivity curve are recorded simultaneously on Ozalid paper which is developed as the recording is made.





The entire unit can be placed in the trunk of an automobile. It is completely enclosed in an aluminum case 18" high, 26" long and 14" wide. In addition to the other components the case contains up to 1500 feet of cable. The average overall weight is 150 pounds.



The galvanometer-recording and electrical assemblies are readily removed from the case. Both are easily replaced without the aid of a special technician.

Announcing

TECTO-LOGGER

PORTABLE ELECTRIC WELL LOGGING UNIT FOR SHALLOW HOLES

available exclusively from

SCHLUMBERGER

Schlumberger now offers the TECTO-LOGGER to the oil industry in order to expand the scope of specialized electrical logging services available.

The TECTO-LOGGER is compact, rugged and highly portable. It is especially designed for use (1) in areas not accessible to regular correlation units; (2) as a cheap dependable service for logging shot holes and extremely shallow core holes where the cost of a larger unit is prohibitive.

Units have been in actual field operation for eight months, and have proved to be entirely dependable. They are simple in design and do not require an experienced operator.

TECTO-LOGGERS are now available on a lease basis. For further information either call your Schlumberger field engineer or address your inquiry to our Houston headquarters.

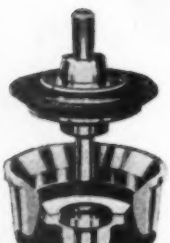
SCHLUMBERGER

SCHLUMBERGER WELL SURVEYING CORP.

HOUSTON, TEXAS

TEAMWORK WINS!

...in baseball...also in slush pump operation



Mission Silver Top Valve for Normal Pressures

Expert teamwork has a fascination for Americans. It is the dominant idea in our sports, our production lines, our democratic government, our efforts for world peace. ***Efficient slush pump operation*** is also dependent on teamwork. Piston, Rod, Packing and Liner must constitute an effective ***team***.

To enable you to obtain MISSION percision and quality in all of these slush pump parts, we have perfected the new MISSION "Super-Service" Liner . . . accurately bored, ***induction*** hardened to ***uniform*** case thickness, precision honed, and "Satin Finished."

MISSION Pistons, Rods, Packing, Liners, and Valves will insure efficient, long-term operation of your slush pumps. Your supply store handles them . . . Mission Manufacturing Co., Houston, Texas. Export: 30 Rockefeller Plaza, New York. Europe: London, England.

Mission Super-Service Valve for High Pressures

"ROLLING DOG" SLIPS
TUBING SWABS
PLUG VALVES
CENTRIFUGAL PUMPS

Silver Anniversary MISSION MANUFACTURING CO. 1951

MISSION MANUFACTURING CO.

one branch of the industry vitally affect the whole, and require corresponding adjustments all along the line. Operations are complex and costly in the extreme. It is an industry where 'know how' is of vital importance.

"Because this is so, we have firmly believed we could serve you better by producing oil, transporting it, refining it into hundreds of useful products, and getting them to you when and where you need them. In other words, by doing the whole job under one roof. Our organization is a closely knit team. Each member of it—refining, research, exploration, etc.—exchanges ideas with every other member. All work together to bring you better and better products at low prices."

M. A. Mattes, advertising manager, Standard Oil Co. of California, in an address before the Advertising Club of Oakland, Calif.

Canadian Oil's Importance

"A prolonged full-scale war would place a serious drain on the petroleum supplies of the United States and your (Canada's) prolific oil production could well become indispensable in fighting a common enemy. There is a mutuality of interest between Canada and the United States. There is a mutuality of interest between the Canadian oil industry and the American oil industry.

"These relationships may well be one of the most important factors in the final determination of whether we shall remain free nations or be engulfed in the godless ideology stemming from the Kremlin.

"I look for nothing but continued progress in your oil industry, a kind of progress that will quickly establish oil as one of the dominant industries in your great nation."

Frank M. Porter, president, American Petroleum Institute, in an address before the annual meeting of Western Canada Petroleum Association, Calgary, Alta.

CALENDAR

1951

March

American Institute of Electrical Engineers, Tulsa section, joint meeting with Student Branch, Oklahoma A. & M. College, A.I.E.E. March 8.

Indiana Independent Petroleum Association, spring convention and refiners and suppliers exhibit, Hotel Severin, Indianapolis, March 8-9.

Texas Oil Jobbers Association, Inc., spring convention and refiners and suppliers exhibit, Shamrock Hotel, Houston, March 9-10.

Mid-West Gas Association, Hotel Fontenelle, Omaha, March 12-14.

First South American Oil Congress, Montevideo, Uruguay, March 12-16.

Illinois Petroleum Marketers Association, annual convention, Sherman Hotel, Chicago, March 13-15.

National Association of Corrosion Engineers, annual conference and exhibition, Statler Hotel, New York City, March 13-16.

You've Got to

PLAY IT SAFE

When it's Fire or Steam!

In the oil industry, two of the hoses you can't afford to take any chances on are fire hose and steam hose. They've got to be designed for the job, *with an extra margin of safety built in.* No hose that leaves our plant gets more care in construction and inspection than the two below. You can depend on them for long, trouble-free *safe* service.

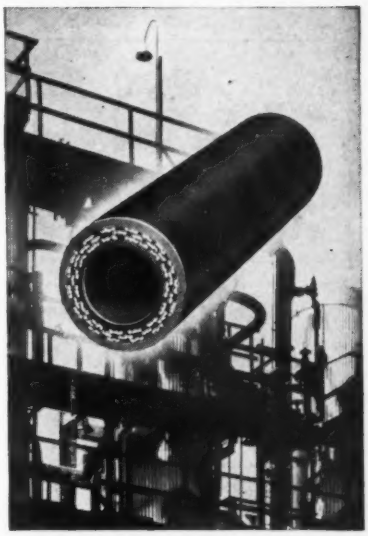
Maltese Cross® Fire Hose . . . . .

The "standard of comparison" with oil refineries for over 80 years . . . unexcelled for foam, chemical or booster use.

The tough cover protects Maltese Cross from oil film, acid fumes and chemicals . . . stops water absorption into the carcass . . . prevents mildew and eliminates need for drying-out after use. Inside is a mildew-inhibited, closely woven duck carcass that provides unusual durability and burst-resistance. Yet Maltese Cross is light, flexible, easy to coil, folds closely.

Fifteen years of active fire-fighting service, plus many more as a utility or clean-up hose, are what you can expect —*and get*—when you play it safe with Maltese Cross.

Monarch® Fiberglas* Steam Hose



Monarch is built to carry saturated steam at temperatures up to 388° F. and pressures up to 200 lbs. . . . and do it day in and day out without failure. The tube is an exclusive Hewitt-Robins development—a special heat-resisting compound that stays soft and flexible without flaking or cracking.

The carcass is multiple-braided Fiberglas cord—unsurpassed for heat resistance and strength—and heavily insulated with heat-resistant rubber. The cover is extra-tough, extra-thick, won't strip or blister . . . highly resistant to heat, abrasion and weather.

For general steam services in the oil industry — insist on Monarch Fiberglas Steam Hose!

* * *

For these and many other specialized oil industry hoses, call your Hewitt Rubber Distributor (listed under "Rubber Products" in the classified 'phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

HEWITT-ROBINS

OIL INDUSTRY HOSE

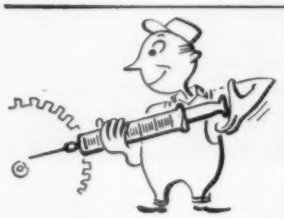
*T.M. of Owens-Corning Fiberglas Corp.

HEWITT-ROBINS HR INCORPORATED

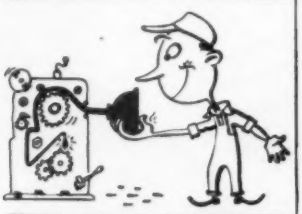
AIR HOSE • BARGE LOADING HOSE • FIRE HOSE • FLOATING ROOF TANK DRAINAGE HOSE
FLUE CLEANING HOSE • FUEL OIL & GASOLINE HOSE • OIL SUCTION & DISCHARGE HOSE
STEAM HOSE • TRUCK TRANSPORT & TANK CAR DISCHARGE-SUCTION HOSE • TANK TRUCK HOSE
TWIN-WELD® WELDING HOSE • PROPANE-BUTANE HOSE FOR HANDLING LIQUEFIED PETROLEUM GASES
WATER HOSE • CONVEYOR BELTING • PIPE SLINGS • RUBBERLOKT® WIRE WHEEL BRUSHES

Manzel AUTOMATIC FORCE FEED LUBRICATION

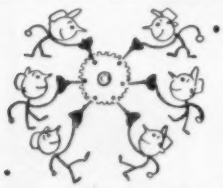
FREES MANPOWER FOR MORE PRODUCTIVE JOBS



Meters the precise amount of oil needed



Reaches vital parts ordinary methods can't lubricate



Gives each wearing point a full-time 'oiler'

Manufacturers using Manzel Lubricators report that they save their initial cost many times over in reduced labor cost, lower oil consumption, and fewer breakdowns. "Manzels" are standard equipment on many makes of engines, pumps, compressors, hydraulic presses, conveyors, and other machinery. Or . . . you can install them on present equipment.

Manzel representatives will gladly supply technical assistance on lubrication problems.

Manzel

Division of
FRONTIER INDUSTRIES INC.
336 BABCOCK ST. • BUFFALO, N.Y.

Gas Appliance Manufacturers Association, annual meeting, The Homestead, Hot Springs, Va., March 19-21.

Ohio Petroleum Marketers Association, annual convention and marketing exposition, Deshler-Wallick Hotel, Columbus, Ohio, March 20-22.

American Petroleum Institute, division of production, Mid-Continent district spring meeting, Herring Hotel, Amarillo, March 21-23.

North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex., March 24.

Texas Independent Producers and Royalty Owners Association, fifth annual meeting, Beaumont, Tex., March 27-28.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 29-30

April

American Gas Association, industrial and commercial gas section, conference on industrial and commercial gas, Shoreham Hotel, Washington, D. C., April 2-4.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, April 2-4.

American Society of Mechanical Engineers, spring meeting, Atlanta, April 2-5.

Oil-Heat Institute of America, annual convention and National Oil-Heat Exposition, Navy Pier and Palmer House, Chicago, April 2-6.

Instrument Society of America, New Jersey section, Essex House, Newark, N. J., April 3.

American Petroleum Institute, division of production, Eastern district meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 3-5.

Pacific Coast Gas Association, annual distribution (technical) meeting, Riverside, Calif., April 4-5.

Midwest Power Conference, fourteenth annual meeting, Sherman Hotel, Chicago, April 4-6.

New York Oil Heating Association, Inc., Hotel Statler, New York, April 9.

Mid-West Regional Gas Sales Conference, Edgewater Beach Hotel, Chicago, April 9-11.

Michigan Petroleum Association, annual spring convention, Detroit Leland Hotel, Detroit, April 10-11.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 10-12.

American Institute of Electrical Engineers, District 4 meeting, McFadden-Deauville Hotel, Miami, April 11-13.

American Gas Association, distribution, motor vehicle, and corrosion conference, Hotel Peabody, Memphis, April 16-18.

American Society of Lubrication Engineers, annual convention and lubrication show, Bellevue-Stratford Hotel, Philadelphia, April 16-18.

Petroleum Industry Electrical Association and Petroleum Electric Supply Association, twenty-third annual joint conference, Hotel Adolphus, Dallas, April 17-19.

National Petroleum Association, Hotel Cleveland, Cleveland, April 18-20.

American Petroleum Institute, Rocky Mountain district spring meeting, Gladstone Hotel, Casper, Wyo., April 19-20.

Brussels International Fair, twenty-fifth annual event, Brussels, Belgium, April 21-May 6.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, joint annual meeting, Jefferson Hotel, St. Louis, April 23-26.

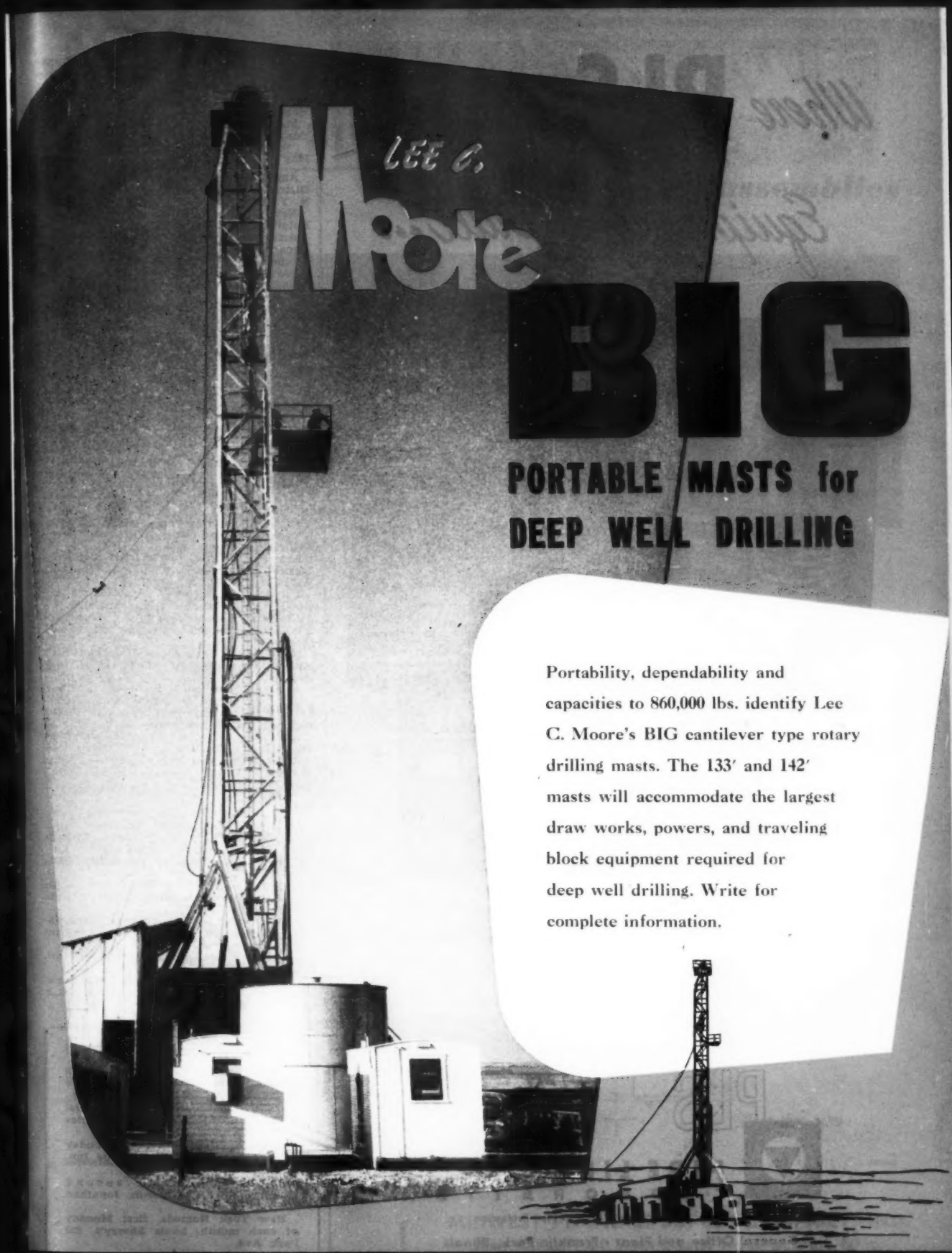
Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

Interstate Oil Compact Commission, spring meeting, La Fonda Hotel, Santa Fe, N. M., April 26-28.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy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Moore
BIG
PORTABLE MASTS for
DEEP WELL DRILLING
Portability, dependability and capacities to 860,000 lbs. identify Lee C. Moore's BIG cantilever type rotary drilling masts. The 133′ and 142′ masts will accommodate the largest draw works, powers, and traveling block equipment required for deep well drilling. Write for complete information.

LEE C. MOORE CORPORATION

TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT • WICHITA • CENTRALIA • PITTSBURGH

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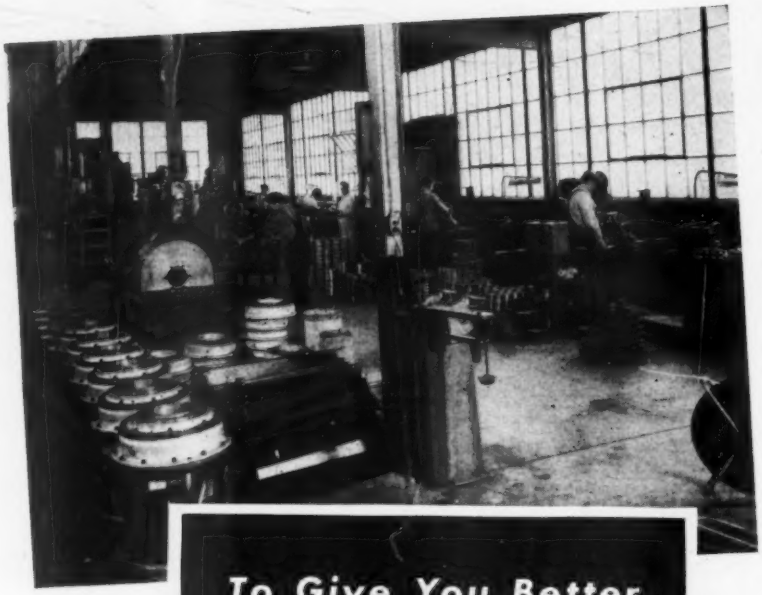
Where PLS-Designed *Equipment is Built...*



To Give You Better
COATING and WRAPPING SERVICE

This modern machine shop is one of the reasons why customers can always count on uniformly fine cleaning, priming, coating and wrapping service at all six PLS plants. Here is built the original equipment designed by PLS engineers for better control of all operations—for pipe protection that is *complete* in every detail.

PLS

PIPE LINE SERVICE CORPORATION

Pioneers in Steel Pipe Protection

General Office and Plant • Franklin Park, Illinois

Plants at Glenwillard, Penna.; Longview, Texas; Corpus Christi, Texas; Harvey, La.; and Sparrows Point, Md.

of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, division of refining, sixteenth mid-year meeting, Mayo Hotel, Tulsa, April 30-May 3.

Materials Handling Conference, International Amphitheatre, Chicago, April 30-May 4.

May

American Institute of Electrical Engineers, District 1 meeting, Hotel Syracuse, Syracuse N. Y., May 2-4.

New York Oil Heating Association, Inc., Hotel Statler, New York, May 7.

American Gas Association, Natural-Gas Department, Dallas, May 7-8.

Independent Petroleum Association of America, mid-year directors' meeting, Cosmopolitan Hotel, Denver, May 7-8.

Gas Appliance Manufacturers Association, natural-gas department spring meeting, Dallas, May 7-9.

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 7-10.

American Petroleum Institute, division of production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

Pacific Coast Gas Association, annual transmission (technical) conference, Bakersfield, Calif., May 16-17.

American Institute of Electrical Engineers, District 5 meeting, Loraine Hotel, Madison, Wis., May 17-19.

Empire State Petroleum Association, Inc., Hotel Statler, Buffalo, N. Y., May 20-22.

American Petroleum Institute, division of marketing, mid-year meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, division of production, mid-year meeting, Brown Palace Hotel, Denver, May 28-June 1.

Institution of Gas Engineers, London, England, May 29-June 1.

Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont., May 31-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

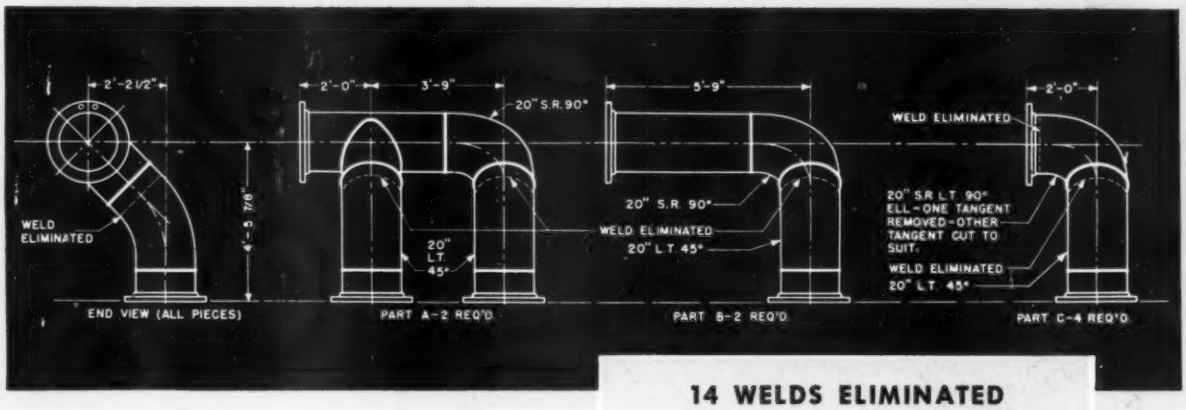
Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, first Monday of each month, Louis Sherry's, 300 Park Ave.

XUM

12% COST REDUCTION... *in these piping subassemblies*



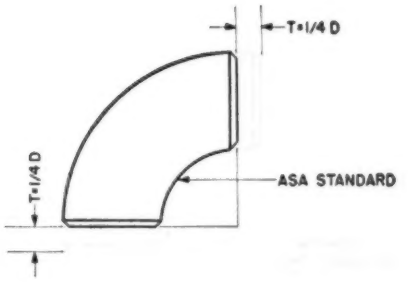
14 WELDS ELIMINATED
9'-8" OF 20" PIPE SAVED

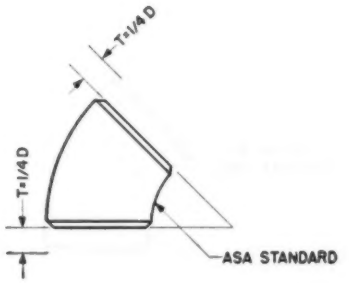
with MIDWEST "LONG TANGENT" ELBOWS

Here is a concrete example of the extra cash value of Midwest "Long Tangent" Elbows. They saved 12% of the cost of this piping.

Each of the subassemblies shown above, if made of ASA elbows, would have required an extra nipple with an extra weld at the dotted line. With the Midwest Long Tangents, both the nipples and the welds were eliminated. Reduced material and labor costs made this substantial saving.

Other advantages of Midwest "Long Tangent" Elbows: pipe and fitting lined up more quickly and accurately, weld is removed from point of maximum bending stress, can be sleeved, slip-on welding flanges are more easily used, and they cost no more than standard elbows usually furnished. Ask for Catalog 48.





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Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic, Los Angeles and Boston • Sales Offices: New York 7—30 Church St. • Chicago 3—79 West Monroe St. Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave. • Tulsa 3—224 Wright Bldg. • Boston 27—426 First St.

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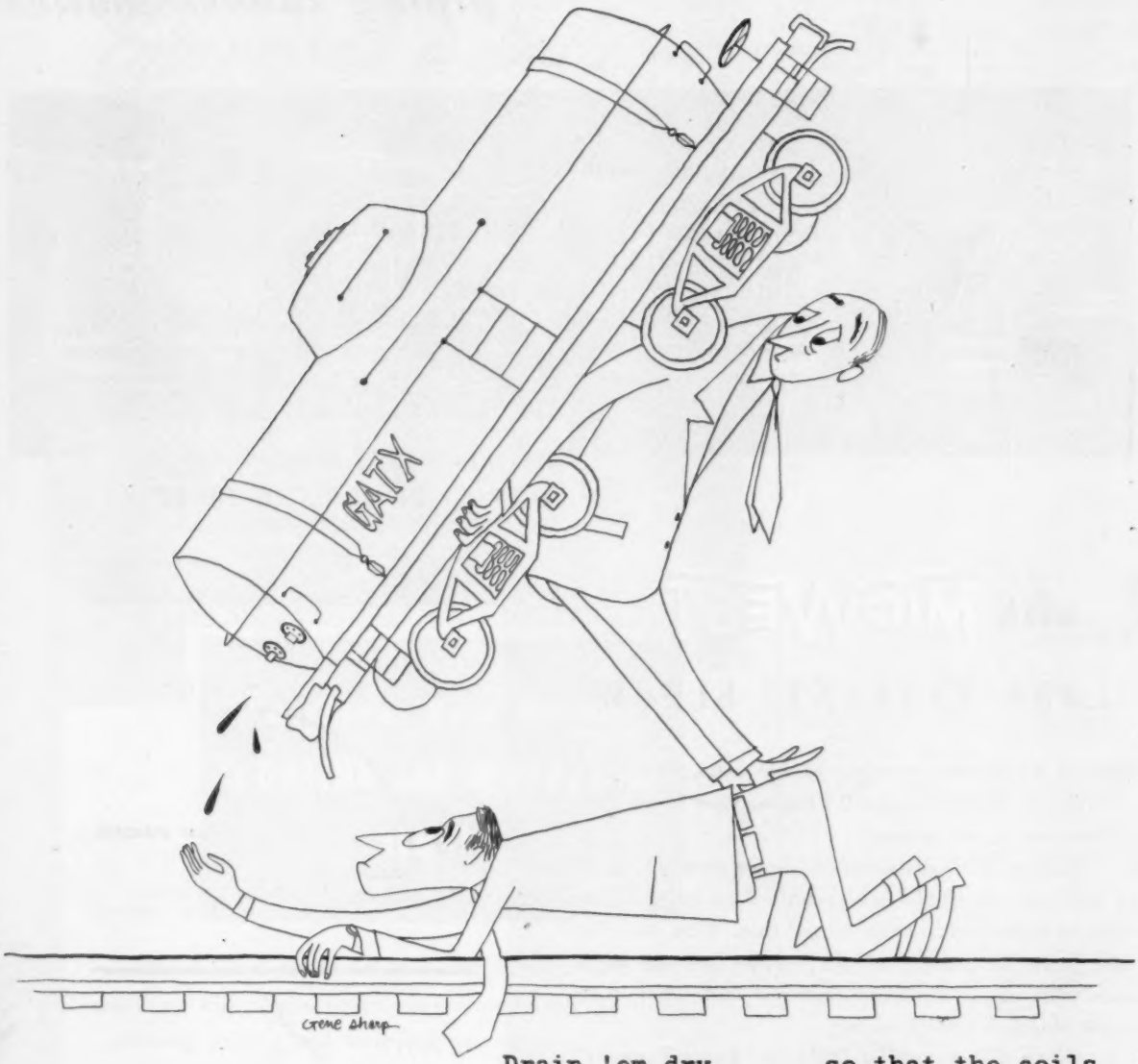

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JOURNALLY Speaking

TWX TU-842

THESE symbols may look strange to some, but not to anyone who has a Bell System teletypewriter. They are the Journal's call letters in the Tulsa ofice.

Oil companies, advertisers, and others anywhere in the United States having TWX machines can type messages right into the Journal office simply by calling TU-842. It's usually cheaper than telephone and faster than telegraph. The network of teletypewriters is quite extensive but many firms use the service chiefly to communicate with their own branch offices, often forgetting that they can be connected to any other machine listed in the nation-wide directory.

In these days of heavily loaded communications lines the TWX can save a lot of time and trouble. So if your firm has one and you want to send us any kind of a message in a hurry, just tell the operator TU-842 and you can "talk" right into our office and it will come out on paper just the way you sent it.

Cooperation

THE coal industry, according to a national magazine, is urging the Government not to allocate steel for oil and gas pipe lines, arguing that it should not be asked to mine coal to make steel to make pipe to carry competing fuels. Now there's a fine, cooperative spirit, but why stop at pipe lines? Cut off steel for drilling, refineries, and tank cars, too. And why should the oil industry strain itself to make gasoline for coal miners? Every man for himself, say we, and Stalin take the hindmost.

Water

WE were under the impression that secondary recovery of oil by water flooding was a business which took large capital, careful engineering, and close economic figuring for a long-range payout. It just never appealed to us as a fertile field for poor-boy investment or as a chance to turn a fast buck.

But the other day we saw a circular offering stock in a company which proposes to engage in a water-flooding operation. The stock costs $1 per share, and can be bought on an easy, time-payment plan, and each purchaser gets free a copy of a book entitled "The Secret of Making a Million." The circular uses the honeyed words and blue-sky claims of the good old gusher days of the early 1920's, including such phrases as "A miracle for you," "We have the oil," "A fortune in 3 years," and "Opportunity is calling."

As soon as we can save up enough for a postage stamp we intend to make a down payment on a share of this stock and get into the water-flooding business on the ground floor. We may need that fortune in 3 years.

Mighty Thick

THIS department recently philosophized on the difficulties of correct spelling and some of the tricky words that frequently throw our editors for a loss, but we might have known we'd be tripped up by a simple, four-letter word. Sure enough, a reader postcards:

"You should add *bail* to your list of misspelled words, or is that oil California-Standard got in Manitoba thick enough to package at the well? *(Page 62, February 15 issue)*. I wasn't proofreading, but your column apparently made me spelling conscious."

We looked up the reference, and there it was, sticking out like a sore thumb: "The well was plugged back to *bale* about 3 bbl. of oil per hour."

No, mister, it wasn't the oil that was thick; it was the editors. Should have stayed on the farm. Dad burn this English language, anyway.

Paradox

THE Government has appropriated $10,000,000 of the taxpayers' money to assist mineral prospectors in locating new ore reserves. The same Government is trying to enact a tax law to prevent oil prospectors from spending their own money in locating new petroleum reserves. We don't get it.

—Henry D. Ralph

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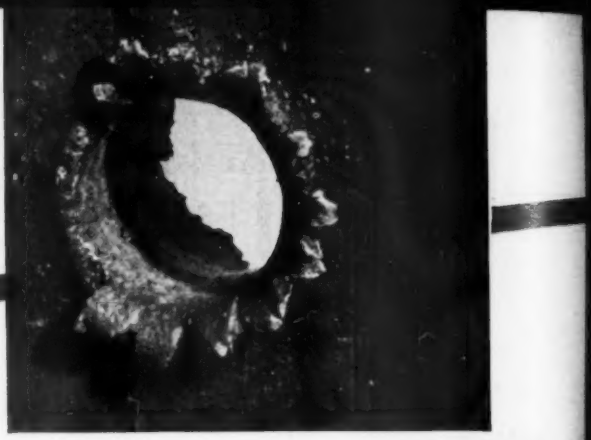
DANGER

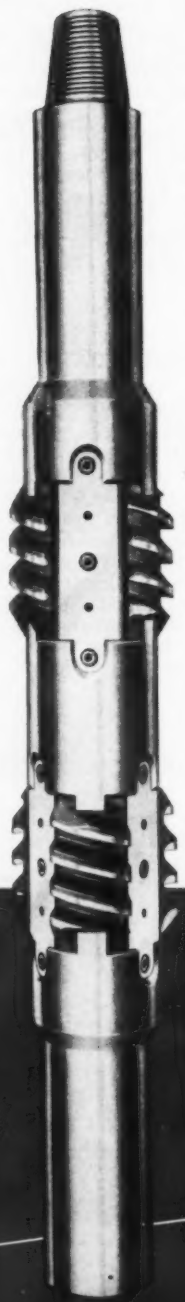


DO NOT RUN packers, testers, swabs or retainers

...until the "working surface" of your casing is clean

This typical burr resulting from a gun-shot hole, clearly shows why so many operators always consider it a "must" to clean the WORKING SURFACE—the vital inner wall of casing—with the new Baker ROTO-VERT Casing Scraper.

It is easy to see why tools with rubber cups, or a rubber packing element, many times fail to set properly, and often are cut, torn and hopelessly damaged while running-in the well. Ninety-nine times out of a hundred, premature setting of packers, testers and retainers, or their failure to effect a leak-proof pack-off, is due *not* to faulty construction or operation of the tool, but to burrs, cement, hardened mud, or other obstructions which . . . PREVENT PASSAGE OF THE SLIPS • CUT OR OTHERWISE DAMAGE THE PACKING ELEMENT; *or* • PRESENT SUCH A ROUGH, UNEVEN SURFACE THAT A LEAK-PROOF PACK-OFF IS IMPOSSIBLE.



The new Baker Model "C" ROTO-VERT Casing Scraper is a helix-blade-type scraper which can be either rotated or "spudded" (reciprocated vertically) for the removal of perforation burrs, imbedded bullets, cement sheath or other obstructions from the inner wall of casing. The body is machined from bar stock, with two sets of machined (not cast) blades positioned for overlapping, 360-degree scraping coverage.

The direction and angle of shear of the deeply hard-faced cutting edges is *exactly opposite* from other helix-blade-type scrapers, which means that the scraping edges of the ROTO-VERT will not "screw down" past burrs, but will actually *shear away* burrs, cement and other obstructions.

CHOOSE THE BAKER CASING SCRAPER EXACTLY RIGHT FOR YOUR WORK

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***For normal scraping,* where rotary equipment is present, the time-tested Baker Model "B" Casing Scraper, Product No. 620-B, continues the popular choice of many operators.**

Why not get in touch with your nearest Baker representative and secure specific recommendations for your next job? Or send for the new illustrated 28-page booklet which contains complete information on the important subject of Casing Scraping the Baker Way.

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Real Reserves

This week the American Petroleum Institute and the American Gas Association publish their annual estimates of proven reserves of oil and gas. Their essential features do not differ materially from the earlier estimates of The Oil and Gas Journal, published January 25. Nor should they, for modern reserve estimates are based on careful scientific principles.

Nevertheless, reserve figures are often misunderstood and sometimes deliberately misused. Most commonly misinterpreted is the ratio between total reserves and amount produced during a year. To say that reserves are 13 times production does not mean that we will "run out of oil" in 13 years. On the contrary, it is assurance that we will not run out of oil because reserves are being added at a rate commensurate with production.

That part of reserve figures labeled "extensions and revisions" has been scoffed at as "finding oil with a pencil instead of a drill." It is nothing of the sort. A new field is always given a conservative reserve, but when more drilling enlarges its area and productivity, the estimates of its ultimate recovery are increased. This process may go on for years as the nature of the reservoir becomes better known, and the reserves thus proven are just as surely "new oil" as any produced by the original wildcat.

Proven reserves are simply working inventory. They include only that oil and gas which can be measured in the ground and which is reasonably certain to be produced by scientific production practices now in use. The nation can bank on obtaining every barrel and cubic foot of the hydrocarbons which the industry's estimates list as recoverable.

It can bank on getting a lot more, too, if economic conditions are favorable. Proven reserves do not include oil and gas which the industry is convinced will be discovered by drilling in promising but untested areas. They do not include oil which may be obtained by various secondary-recovery methods in the vast majority of fields where these are not now but some day may be applied. Nor do they include possible increased recovery by future improvements in reservoir control and producing practices. Finally, no account is taken of the possibilities of synthetic fuels from coal, shale, or other sources.

The current estimates of proven reserves are assurance that the nation will have adequate supplies for many years. This assurance can be sustained indefinitely if the industry is encouraged to keep on exploring and producing economically. So long as the industry has the steel and other materials to drill, and so long as it has the economic inducements of price and incentive taxation, the nation need never worry about running out of oil.

The country's real proven reserve is a vigorous petroleum industry with the demonstrated ability to keep supply ahead of demand.

XUM

THIS WEEK

DEPLETION—NPC committee, issuing interim report on possibility of increasing products output in Western Hemisphere by 1,000,000 bbl. daily, declares that any tinkering with present 27½ per cent depletion allowance will present an unsurmountable handicap to fulfilling goal. . . . ¶Industry leaders strongly support committee's stand, stating that to cut depletion allowance will cause setbacks in production, exploration, offshore work. . . .

STEEL—PAD distributing official forms which must be filed with agency by producers in obtaining priorities for oil-country tubular goods. . . . ¶Deputy petroleum administrator tells California group that control officials are more familiar with oil industry's steel needs during present emergency than similar control setups during start of World War II. . . .

WASHINGTON—Secretary of Interior Chapman calls for immediate private development of synthetic-liquid-fuels industry with government aid in order to assure adequate supplies in the future. . . . ¶Bill introduced in Congress to extend Interstate Oil Compact Commission to 1955. . . . ¶Broadening of Natural Gas Act to cover condemnation of land for storage of natural gas underground sought in new legislation. . . . ¶New orders issued by various agencies calling for control of essential materials vital to defense program. . . .

INDUSTRY—FPC approves three huge natural-gas projects. . . . Included are United Gas expansion, construction of transmission system for New England area by Algonquin Gas Transmission, and capacity increase on Texas Eastern Transmission's system. . . . ¶Standard of Indiana plans to spend more money this year, executives report. . . . ¶Oil industry must spend more money than ever to meet increasing demands, Standard of New Jersey chairman declares. . . . Chain of 14 Ideco supply stores purchased by H. K. Porter Co., Pittsburgh. . . . ¶Max Steineke, Arabian American Oil Co., named recipient of A.A.P.G.'s Sidney Powers Memorial Medal. . . . Humble completes new research lab at Baytown, Tex.

VALUABLE DUST.—With mask and gloves, an operator draws a hot sample of a catalyst being studied in the pilot cracking unit of Humble Oil & Refining Co.'s new research laboratory, one of many examples of the constant research conducted by the petroleum industry to increase the quantity and quality of products for American consumers.

RESERVES—Inventory of working stocks of proven reserves of crude oil, natural gas, and natural-gas liquids now at all-time high, A.P.I., A.G.A. report. . . . ¶Despite near record-breaking withdrawals during 1950, estimates of total liquid hydrocarbons jumped 1.1 billion barrels to 29.5 billion barrels at year's end. . . . Dry natural-gas reserves estimated at over 185 billion cubic feet. . . .

ACTIVITY—Crude production for week ended March 3 averaged 5,923,875 bbl. daily, up 68,550 bbl. daily for the week. . . . ¶Total completions for the week increased to 691 wells compared with 664 for previous week and 677 for same week last year. . . . Wildcat completions gained 55 wells for the week to 185. . . . ¶Rotary rigs operating in United States on February 26 totaled 2,044 compared with 2,073 a week earlier and 1,927 on same date last year. . . .

TRENDS—Refiners set three new records for week ended February 24. . . . Crude runs averaged 6,524,000 bbl. daily, up 19,000 bbl. daily from previous high. . . . ¶Distillate production averaged 1,506,000 bbl. daily for the week, a new record by 69,000 bbl. daily. . . . ¶Gasoline stocks reached the all-time high of 136,870,000 bbl., but the total represented fewer days' supply than last year's peak due to increases in demand. . . .

EXPLORATION—Deep Mississippi wildcat test has gas blowout at 20,300 ft. . . . May prove to be world's deepest producer. . . . ¶First annual meeting of Rocky Mountain Section, A.A.P.G., devoted to discussion of "pure geology." . . . ¶Los Angeles firm opens subsidiary exploration company in Midland, Tex. . . .

CANADA—Alberta review shows province set new all-time highs in oil-industry activity. . . . New revenue highs set. . . . ¶Canada forms petroleum division within trade and commerce department to give nation's expanding defense program top priority on available oil supplies. . . . Hopkins of Imperial Oil to head setup which will work closely with United States' PAD. . . .

INTERNATIONAL—Industry reports new efforts of ECA against prevailing price structure in Persian Gulf area. . . . ¶Pemex plans new modern lube-oil plant at Salamanca refinery. . . . ¶First Mexican tanker carrying crude to Argentina arrives in Buenos Aires. . . . ¶France cuts octane level on motor fuel due to shortage of TEL. . . .

Projects Approved

United Gas, Texas Eastern, Algonquin Gas Transmission given FPC authority to build huge natural-gas systems

WASHINGTON.—United Gas Pipe Line Co., of Shreveport—already the world's largest natural-gas pipeline company in terms of maximum daily delivery capacity—has been given Federal Power Commission approval to carry out an expansion program designed to increase its system's capacity by 920,000,000 cu. ft. per day to an estimated total of 3,805,200,000 cu. ft. daily.

The United project, one of the largest expansion programs ever authorized by FPC, includes construction of approximately 1,000 miles of pipe line and installation of 63,000 in horsepower at new and existing compressor stations. Estimated cost of these facilities is $111,861,749.

Two other expansion and construction projects were approved by the commission along with United's program: Texas Eastern Transmission Co., of Shreveport, authorized to construct facilities which will increase daily capacity of its system by 465,700,000 cu. ft. to approximately 1,206,500,000 cu. ft. daily; and Algonquin Gas Transmission Co., of Boston, authorized to build a pipe-line system in New England which will supply natural gas to certain markets in Massachusetts, Rhode Island, Connecticut, and New Jersey.

Gas sales O.K.'d.—United Gas will make new sales of natural gas to the following two companies: Texas Eastern, 390,250,000 cu. ft. on a peak day and 135,124,260,000 cu. ft. annually; and Mississippi River Fuel Corp., of St. Louis, 150,000,000 cu. ft. on a peak day and 52,448,885,000 cu. ft. annually.

The Texas Eastern project, which will cost approximately $96,305,118, includes 791 miles of 30-in. line extending from a connection with United's system near Kosciusko, Miss. Part of the firm's increased capacity will go to Algonquin for resale in New England, with the remainder to be delivered to new and existing customers.

United lets contract.—United has awarded contract to Brown & Root, Inc. of Houston covering various phases of engineering, construction, and other services on its expansion program.

Company officials announced at the same time that a contract covering additional major portions of the project has been "virtually completed" with Gulf-Southern Contractors, of Fort Worth.

The enlarged facilities will serve the multiple purpose of increasing the flexibility of the United Gas system, provide new and substantial additional reserves of natural gas, obtain a more balanced distribution of reserves presently connected, and provide capacity to meet requirements of a substantial additional volume of sales. United Gas now serves more than 400 cities and towns in Texas, Louisiana, Mississippi, southern Alabama, and northwestern Florida.

Texas lines.—Construction in Texas will include approximately 319 miles of 30-in. steel pipe, 53 miles of 24-in., 4 miles of 20-in., a new 8,000-hp. compressor station at Needville, and facilities to provide an additional 34,200-hp. at existing compressor stations now located at Refugio, Edna, Goodrich, and Magasco.

In Louisiana, approximately 430 miles of pipe lines varying in size from 8 to 30-in. will be constructed. New compressor stations are to be built in the vicinity of Lafayette and in Livingston Parish. In Mississippi, the project will include approximately 200 miles of 30-in., 24-in., and 20-in. pipe line, and a compressor station at Verna, near McComb.

Offshore system.—An interesting aspect of United's new program is the construction of a 20-in. and 14-in. gathering line 28 miles into the Gulf of Mexico. This marks the second entrant in the campaign to market gas from the 19 gas or gas-condensate areas off Louisiana. Tennessee Gas Transmission Co. was the first pipeline concern to go after Gulf of Mexico gas. It will soon be picking up gas from Rollover field, 9 miles off the coast of Vermilion Parish. The 8⅝-in. line was installed and will be operated by Marine Gathering Co., Houston.

United's offshore line will be 20-in. pipe from the coast of St. Mary Parish out to Pure Oil Co.'s drilling platform in Block 32, 15 miles in the Gulf. A 14-in. line will extend from the Pure platform approximately 12 miles farther out to Magnolia Petroleum Co.'s gas in Block 45. Another line will extend 14.5 miles from Block 45 to another Magnolia gas area in Block 110.

Pure block.—Pure's Block 32 field was discovered on December 16, 1949. The company presently has two producing oil wells in the field and one well drilling. It plans to recomplete its two oil wells as gas producers when the offshore line is laid. Gas sands in the area are found between 10 and 12,000 ft. Pure has tentative plans to drill at least 16 wells to satisfy United's requirements. It is expected that each well will have a daily capacity of from 15 to 20 million cubic feet of gas, or a possible total of 320 million cubic feet per day.

Magnolia brought in the Block 45 field on November 10, 1948, with a gas-condensate producer. It produced 33 bbl. of condensate with a gas-oil ratio of 150,000 to 1 on initial test from sand at 11,350 ft. and has been shut in since that time. No additional wells have been drilled.

Block 110 field was discovered by Magnolia in 1949 with completion of a gas-condensate producer on July 29. Two other wells have been drilled in this field, one gas-condensate producer and one dry hole. On test, the discovery well produced 30 bbl. of condensate daily with a gas-oil ratio of 75,144 to 1 from producing sand at 9,894-10,076 ft.

Texas Eastern work.—Texas Eastern announced it will start work immediately on its newly authorized line. Some preliminary work already has been carried out with aerial surveys of the route completed, and ground surveying and acquisition of right-of-way commenced. First shipments of pipe have been received.

Pipe laying will begin in May for a 35-mile, 30-in. line from Connellsville to the Oakford, Pa., storage reservoir. Ten compressor stations for the company's expansion program will be built this year under contract with Brown & Root. Some of these stations will be on the new line and others will be on Texas Eastern's existing system. Brown & Root has general contract for engineering and supervision of the Texas Eastern construction program.

Of the company's increased capacity, 220,000,000 cu. ft. daily is destined for Algonquin, for resale to utilities in New England, including Boston. George T. Naff, executive vice president of Texas Eastern, said in Shreveport, that the Federal Power Commission authorization of the line comes at a fortunate time not only New England but also in view of the needs of defense industries in other states served.

From Mississippi.—The new line will extend from Kosciusko, Miss., through northwestern Alabama, Tennessee, Kentucky, and southeastern Ohio, to Connellsville, Pa., where it will join the existing inch system of Texas Eastern. From Connellsville, a new line will be built to the 105,000,000,000-cu. ft. Oakford gas-storage project jointly owned by Texas Eastern and New York State Natural Gas Corp.

Seven compressor stations will be built on the new line and six stations will be added to the company's present system east of Connellsville. These stations aggregating 98,900 hp., will bring total power of the entire system to 376,300 hp. Naff said every effort will be made to expedite construction so that the new service can be commenced as early as possible.

Algonquin project. — Algonquin was authorized to construct approximately 253 miles of main line and 279.2 miles of laterals in the New England states. Total estimated cost of the pipe-line system, which will deliver a total maximum daily volume of 217,800,000 cu. ft. daily, is $30,477,800.

The firm's system will connect with Texas Eastern's main line near Lambertville, N. J., with 150 miles of 26-in. main line extending from that point to the Hartford, Conn., area. From there, 103.6 miles of 24-in. line will extend as a continuation of the 26-in. line to a point near Boston.

Algonquin plans to raise funds necessary to finance its project through sale of bonds equal to 75 per cent of its capital and sale of common stock in an amount equal to 25 per cent. Bonds will be for 20 years, and interest rate is expected to be about 3½ per cent yearly.

Conditions set.—FPC conditioned the Algonquin authorization to require the company to file at least 2 months prior to commencement of service a tariff satisfactory to the commission which will include a single demand-commodity-type rate schedule, with all rules and regulations relating to rates and charges, together with a cost-of-service study. The firm may, if its proposed operations make it desirable, submit a proposed straight-line-commodity rate to be optional for delivery and sale of gas to its small customers.

Algonquin also is required to establish interconnections with, and enter into agreements for, emergency interchange of gas with any natural-gas system or systems serving the New England area at wholesale.

Well Blows Out

Mississippi test may be world's deepest producer

Leigh S. McCaslin, Jr.

HOUSTON.—A deep wildcat test in Stone County, Mississippi, had prospects of becoming the world's deepest producer as operators started out of the hole March 5 after hitting natural gas at 20,300 ft.

The test, George Vasen 1 Tung Oil Corp., blew out on March 2 while diamond coring was under way at 20,300 ft., according to Tom McKinney, drilling superintendent for Vasen.

Gas and drilling mud was thrown into the air 60 to 75 ft. when the well went out of control. "A little better than 8-lb." mud was being used at the time, McKinney said. This would indicate a bottom-hole pressure of around 9,000 psi.

Under control.—By the night of March 2 the well was under control, after 13 tons of weighting material had been put in the hole. A 30-m.p.h. wind was blowing in such a direction that steam boilers did not set the rig on fire. No one was injured in the blowout.

Halliburton Oil Well Cementing Co. sent pumps to the well to augment three 30-in. pumps on the rig, and Oil Base, Inc., rushed a mud engineer to the scene.

May make condensate. — McKinney said that there are indications the well is making either condensate or oil along with the gas. In conditioning the mud to come out of the hole, it was noted that it was cut and it was necessary to add jel.

The well will probably be drilled through the pay sand which was struck at 20,300 ft., according to the drilling superintendent.

Vasen is not at the wellsite, as he has been ill for several weeks at his Oak Park, Ill., home.

The 1 Tung Oil Corp. is located in CSW NE 9-2s-11w. It has been diamond-cored continuously from 14,450 ft.

1951 Outlook

Higher expenditures are planned by Standard (Ind.)

CHICAGO. — Budgets of Standard Oil Co. (Ind.) and its subsidiaries indicate a substantial increase in capital expenditures for 1951, but shortages of materials, building restrictions, and possible governmental controls may tend to reduce this.

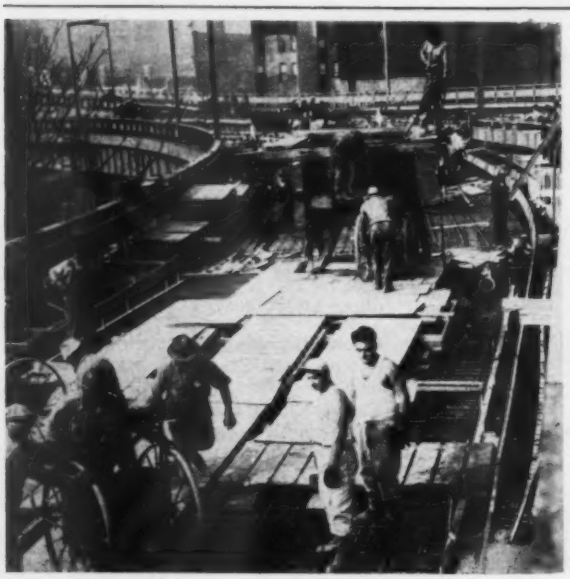
Discussing the future outlook in the company's annual report for 1950, Robert E. Wilson, chairman of the board, and A. W. Peake, president, said that due to these anticipated shortages, restrictions, and controls, it is harder than usual to predict the exact levels of capital expenditures.

"We doubtless face another year of expansion in the demand for petroleum products, and meeting that demand would tax our energies and facilities even in normal times," they said. "It will be extremely difficult when our operations and building programs are certain to be hampered." The executive reported, however, that it is fortunate that the Petroleum Administration for Defense is "well staffed with capable oil men who know the industry."

Prices.—While the company does not oppose reasonable over-all limits on oil prices in the emergency, "rigid price controls on individual products do create serious economic problems in the oil business," the executive said.

"Price flexibility is essential in an industry like ours where frequent shifts in yields between different products are necessary to meet varying seasonal change. Changes in the supply-and-demand picture in different areas due to unusual weather or other factors also require flexibility in order to bring about changes in the distribution pattern."

Expenditures. — Capital expenditures of the company during 1950 were $127,438,792, fairly close to expenditures the previous year, the executives revealed. More than half of the amount went for drilling wells and buying leases to maintain and add to the firm's oil and gas production. This level of capital outlays, together with higher earnings and charges for de-



"Hot Oil" Ramp

Ice and snow which is making driving hazardous in the East is giving no trouble to drivers entering and leaving New York City's new $24,000,000 bus terminal, thanks to these specially prepared ramps, shown here under construction. They are continually heated by circulation of a special petroleum product, S/V Sovaloid S, manufactured by Socony-Vacuum Oil Co., Inc.

preciation and depletion, made it possible to pay off approximately $25,000,000 of the company's consolidated debt during the year, Wilson and Peake said.

Ideco Supply Stores Sold

PITTSBURGH.—T. M. Evans, president of H. K. Porter Co., Inc., Pittsburgh, and J. M. Gardner, president of International Derrick & Equipment Co., Dallas, have announced the purchase, by H. K. Porter, of the chain of 14 Ideco supply stores. The sale is effective immediately.

H. K. Porter now operates 11 stores in its Jarecki division in Texas and Oklahoma, and the addition of the 14 Ideco stores will widen coverage to include Louisiana, Kansas, and New Mexico.

"The sale of our oil-field outlets," Gardner said, "was the result of Ideco's decision to concentrate solely on development and manufacture." All other operations of International Derrick & Equipment Co., including the machinery and export division and plant operations, will remain unchanged.

The supply stores will be operated as Jarecki International Supply division of H. K. Porter Co., Inc., and will continue to sell and service the oil-field products manufactured by Ideco and its parent, Dresser Industries, Inc. In addition, Ideco will augment its present staff of technical-service engineers and field-service personnel to provide a close relationship with customers and distributors.

H. K. Porter has requested all present employes of the Ideco Supply Stores division to become associated with this new endeavor.

Steineke to Get Medal

Max Steineke, chief geological consultant to Arabian American Oil Co., San Francisco, has been designated as recipient of the Sidney Powers Memorial Medal of the American Association of Petroleum Geologists, and will be presented the gold medal and scroll, signifying the highest honor in the science of petroleum geology, at the thirty-sixth annual meeting of the association in St. Louis April 24.

Awarded in recognition of distinguished and outstanding contributions to, and achievements in, petroleum geology, the honor gives public recognition to Steineke's signal success in discovering and developing vast oil resources in Saudi Arabia. The A.A.P.G. meeting will be held jointly with the Society of Economic Paleontologists and Mineralogists, and the Society of Exploration Geophysicists.

Steineke is the fifth recipient of the Sidney Powers Memorial Medal, others being Wallace E. Pratt, 1945; Alexander Deussen, 1947; A. I. Levorsen, 1948; and E. DeGolyer, 1950.

Reserves Gain

Inventory of working stocks of proven reserves of crude, gas, natural-gas liquids at new highs, A.P.I., A.G.A. report

ONCE again the annual inventory of the petroleum industry's working stock of proven reserves of crude oil, natural-gas liquids (condensate, natural gasoline, liquefied petroleum gas), and natural gas as compiled by special reserve committees of the American Petroleum Institute and the American Gas Association shows increases to new all-time highs.

Despite near record-breaking withdrawals during 1950, estimates of total liquid hydrocarbons jumped 1.1 billion barrels to 29.5 billion barrels at year end. Estimates of remaining reserves of dry natural gas at the end of 1950 were over 185 billion cubic feet, an increase of more than 5.2 billion cubic feet during the year.

A review of annual figures shows that estimates of this country's proven reserves of liquid hydrocarbons have been more than doubled since 1933 when the first comprehensive estimates were compiled. During this 18-year period American oil men have added to the nation's petroleum reserves every year except for one war year when their activity was restricted by regulations and shortages of manpower and materials.

Significant.—The all-time highs reached at the end of 1950 have special significance this year as the security-conscious country evaluates its internal strength.

The proven reserves of liquid hy-

TABLE 1—THUMBNAIL SUMMARY OF THE REPORT*
(Thousands of barrels)

Reserves—	Dec. 31, 1949	Dec. 31, 1950	Increase 1950 over 1949
Crude oil	24,649,480	25,268,398	618,909
Natural gas liquids	3,729,012	4,267,663	538,651
Total liquid hydrocarbons	28,378,501	29,536,061	1,157,560
Natural gas (M.c.f.)	180,381,344	185,592,699	5,211,355
New supplies developed in—	**1949**	**1950**	**Increase 1950 over 1949**
Crude oil	3,187,845	2,562,685	—625,160
Natural gas liquids	386,776	766,062	379,286
Total liquid hydrocarbons	3,574,621	3,328,747	—245,874
Production—	**1949**	**1950**	**Increase 1950 over 1949**
Crude oil	1,818,800	1,943,776	124,976
Natural gas liquids	198,547	227,411	28,864
Total liquid hydrocarbons	2,017,347	2,171,187	153,840
Natural gas (M.c.f.)	6,245,041	6,892,678	647,637

TABLE 2—ESTIMATED PROVEN RESERVES OF CRUDE OIL IN THE UNITED STATES
(Thousands of barrels)

	Proven reserves as of 12-31-49	Extensions and revisions	New discoveries	Production during 1950	Proven reserves as of 12-31-50 (Cols. 1+2+3 less Col. 4)	Changes in reserves during 1950 (Col. 5 less Col. 1)
	1	2	3	4	5	6
Alabama	3,547	2,376	116	643	5,396	1,849
Arkansas	297,463	69,163	4,284	29,201	341,709	44,246
California	3,822,751	227,673	10,745	327,607	3,733,562	—89,189
Colorado	344,812	15,215	2,590	23,088	339,529	—5,283
Illinois	468,138	150,509	8,582	63,011	564,218	96,080
Indiana	50,209	7,440	9,969	10,246	57,372	7,163
Kansas	738,390	73,680	27,698	107,581	732,187	—6,203
Kentucky	56,168	7,676	2,415	10,388	55,871	—297
Louisiana	1,909,769	396,285	79,342	200,259	2,185,137	275,368
Michigan	66,496	26,729	1,409	15,917	78,717	12,221
Mississippi	402,860	15,819	2,900	35,874	385,705	—17,155
Montana	112,393	7,141	240	8,502	111,272	—1,121
Nebraska	1,624	5,368	4,033	1,325	9,700	8,076
New Mexico	592,222	31,065	12,418	43,723	591,982	—240
New York	62,900	.....	.....	4,092	58,808	—4,092
Ohio	27,703	2,875	.....	3,314	27,264	—439
Oklahoma	1,329,918	193,331	37,531	163,867	1,396,913	66,995
Pennsylvania	103,356	15,000	.....	11,996	106,360	3,004
Texas	13,509,732	551,170	338,669	817,929	13,581,642	71,910
Utah	15,831	7,000	25	1,227	21,629	5,798
West Virginia	37,992	3,500	350	2,800	39,042	1,050
Wyoming	691,602	188,434	21,600	60,620	841,016	149,414
Miscellaneous	3,613	320	.....	566	3,367	—246
Total U. S.	24,649,489	1,997,769	564,916	1,943,776	25,268,398	618,909

*Florida, Missouri, Tennessee, and Virginia.

TABLE 3—ESTIMATED PROVEN RESERVES OF NATURAL-GAS LIQUIDS IN THE UNITED STATES

(Includes condensate, natural gasoline, and liquefied petroleum gases.)
(Thousands of barrels)

	Proven reserves as of 12-31-49 1	Extensions and revisions 2	New discoveries 3	Production during 1950 4	Proven reserves as of 12-31-50 (Cols. 1+2+3 less Col. 4) 5	Changes in reserves during 1950 (Col. 5 less Col. 1) 6
Arkansas	55,642	745	230	3,679	52,938	—2,704
California	320,275	71,079	250	28,217	363,387	43,112
Colorado	24,190	—10,837	.....	432	12,921	—11,269
Illinois	26,666	3,003	28	3,438	26,259	407
Indiana	126	34	24	32	152	26
Kansas	106,405	60,578	341	3,746	163,578	57,173
Kentucky	13,245	308	154	1,780	11,927	—1,318
Louisiana	596,422	56,492	18,992	28,394	643,512	47,090
Michigan	1,203	—75	14	124	1,018	—185
Mississippi	56,407	2,040	100	2,650	55,897	—510
Montana	3,710	81	.....	244	3,547	—163
Nebraska	37	65	140	7	235	198
New Mexico	85,719	11,773	1,370	4,965	93,897	8,178
Ohio	1,670	108	12	102	1,688	18
Oklahoma	234,030	61,897	4,922	20,946	279,903	45,873
Pennsylvania	2,643	135	68	247	2,599	—44
Texas	2,143,711	443,190	31,326	122,188	2,496,039	352,328
Utah	208	—9	.....	5	194	—14
West Virginia	12,831	634	212	4,701	8,976	—3,855
Wyoming	43,863	6,636	.....	1,512	48,987	5,124
Miscellaneous	9	2	.....	2	9	.....
Total U. S.	3,729,012	707,879	58,183	227,411	4,267,663	538,651

drocarbons and natural gas referred to in the A.P.I.-A.G.A. report apply only to those reserves whose locations and extent have been proven and measured. They do not include any estimate of oil and/or gas which may underlie the vast untested acreage which appears favorable to the accumulation of oil and gas in the United States.

Liquid hydrocarbons.—The ratio of reserves to production at the end of last year was about 13.5, essentially the same as the previous year-end ratio. This indicates that the current high withdrawal rates are not out of proportion to the "finding" rate. This ratio cannot be used to measure the rate at which these reserves can be produced.

Texas, with an increase of 424 million barrels, and Louisiana, with an increase of 322 million barrels of liquid hydrocarbons, accounted for about 65 per cent of the total increase estimated for the country. Wyoming, up 154 million barrels, Oklahoma, up 112 million barrels, and Illinois, up 96 million barrels, accounted for an additional 31 per cent.

Dry natural gas.—Reflecting new pipe-line outlets and the resulting increase of markets, the ratio of reserves to production at the end of last year dropped from nearly 29 at the end of 1949 to approximately 27. This drop merely indicates that the country's backlog of gas is beginning to be used. Production of natural gas increased from 6,245 billion cubic feet in 1949 to 6,893 billion cubic feet in 1950. This production equals gross withdrawals less gas injected into underground reservoirs for cycling and pressure maintenance.

Texas, Louisiana, and New Mexico accounted for more than the net increase of 5.2 billion cubic feet of natural gas as two of the larger gas-producing states, Kansas and California, showed decreases, and a third large gas-producing state, Oklahoma, showed only a token increase.

TABLE 4—ESTIMATED PROVEN RECOVERABLE RESERVES OF NATURAL GAS IN THE UNITED STATES

(Millions of cubic feet—14.65 psia. at 60° F.)

	Reserves as of 12-31-49	Extensions and revisions	New discoveries	Net change in underground storage	Net production	Total
Arkansas	874,190	65,072	23,129	540	55,338	907,593
California*	9,991,635	225,279	71,840	4,028	532,396	9,760,386
Colorado	1,227,095	—134,453	41,426	0	18,595	1,115,473
Illinois	233,192	26,774	5,700	0	35,773	229,893
Indiana	25,200	6,720	4,920	750	6,400	31,190
Kansas	14,089,560	64,729	30,360	153	393,968	13,790,834
Kentucky	1,349,397	49,294	8,200	—908	75,400	1,330,583
Louisiana*	26,687,811	2,010,120	751,133	0	915,798	28,533,266
Michigan	214,911	—14,820	2,741	10,528	18,286	195,074
Mississippi	2,528,969	130,470	5,030	0	145,263	2,519,206
Montana	803,471	34,951	0	2,402	42,463	797,361
Nebraska	8,063	9,028	28,073	0	1,058	44,106
New Mexico	6,241,003	866,625	124,404	6,883	248,245	6,990,670
New York	66,685	200	0	1,094	3,200	64,779
Ohio	652,571	38,751	7,900	6,840	47,200	658,862
Oklahoma	11,625,979	486,813	121,163	8,250	607,918	11,634,287
Pennsylvania	621,680	31,000	50,000	—509	75,000	627,171
Texas*	99,170,403	5,055,893	1,557,691	490	3,380,400	102,404,077
Utah	65,577	8,196	15,112	0	4,133	84,752
West Virginia	1,715,233	105,152	21,750	13,540	205,000	1,650,675
Wyoming	2,173,677	96,631	2,749	220	78,288	2,194,989
Miscellaneous	15,042	9,956	4,030	0	1,556	27,472
Total U. S.	180,381,344	9,172,381	2,877,351	54,301	6,892,678	185,592,699

*Includes offshore reserves.

Expansion Needs

Oil industry must spend more money, Brown says

Dahl M. Duff

NEW YORK.—The petroleum industry is faced with the necessity of spending more money than ever before to meet the needs of expansion in the present period of "twilight mobilization," Courtney C. Brown, assistant to the chairman of the board of Standard Oil Co. (N. J.), said last week.

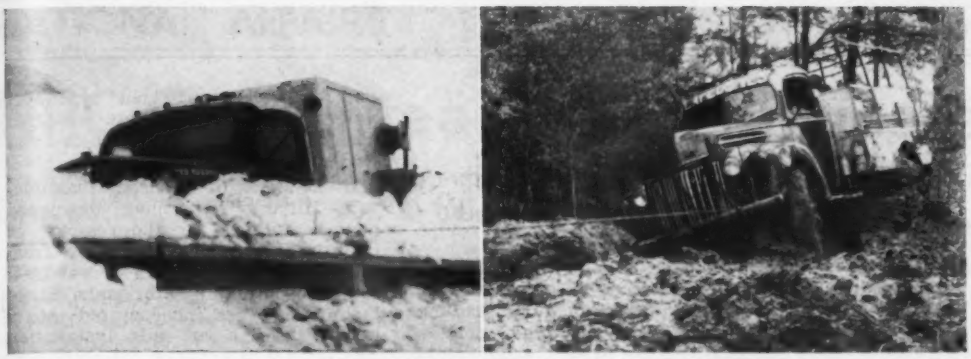
Brown, who until recently was head of the petroleum-economics division of the coordination and economics department of the company, said the surplus capacity built up in the industry since the war has dwindled to an uncomfortably low level.

"There is still a small amount of leeway left, but there is immediately facing the petroleum industry a renewed period of substantial expansion in our capacity at all levels—crude producing, refining, and transportation," he said. "It will take more money than the industry has ever spent before for capital outlays.

Money needed.—"At the Government's request, a study is now being made to determine the cost in men, in materials, and in money, of an additional capacity of a million barrels daily in the Western Hemisphere, expressed in terms of end products. I do not know how much the cost would be, but it seems safe and appropriate to say that the financial burden would be greater than ever experienced before. It could be as much as 4 or 5 billion dollars—and that would be for expansion only—it does not include the cost of replacing plant and equipment that is currently being worn out.

"The big question is where could the money come from—certainly not very quickly out of earnings under present conditions. I believe that the position of the oil industry in this connection is not unlike that of many other major segments of American enterprise, although it may differ in degree."

Price problem.—Brown's discussion of the problems of the industry during the present emergency was given before the New York Patent Law Association. Besides the necessity for industrial expansion, he emphasized two other principal points: the func-



Winter Havoc

Some of the difficulty exploration crews frequently encounter during winter weather can be visualized here. At left, a geophysical truck of The Texas Co. battles deep snow in Wyoming. Right: Texaco truck being winched out of deep Mississippi mud.

tional nature of prices which he said are a sensitive regulator to the changing needs of the economy; and the necessity of maintaining incentives for continued exploration and development of oil reserves.

Brown said the implication of frozen prices and frozen wages in a prolonged period of twilight mobilization is much more serious than in a period of sharp crisis of limited duration. He asked that both Government and industry, including oil, search for ways to circumvent the necessity for prolonged application of rigid controls.

"The petroleum industry is a joint-product industry. That means we make a lot of different products out of a single raw material—crude oil. It is also a seasonal business—its winter demands are substantially larger than its summer demands. And the pattern of demands made against the industry in the winter differs from that of the summer. Both of these features, the joint product characteristic and the seasonal variability, require a high element of flexibility, and a sensitivity within the industry to the changing pattern of demands among products from time to time."

Foreign uncertainties. — Commenting on foreign oil resources, he said: "Middle East oil is used for the most part in Europe. It still is necessary to supplement it, however, by shipment to Europe from the Caribbean. If the Caribbean should be called upon to make up even a part of the large European shortages that would result from loss of Middle East as a source of supply, then the United States would thereby be deprived of access to this supplementary Caribbean oil that is so conveniently close at hand."

CANADA

Alberta Report

1950 operations set new activity, revenue highs

CALGARY, Alta.—The Alberta oil industry set all-time records in production, revenue, completions, and total footage drilled during 1950, a review of operations shows.

During the year a total of 27,595,664 bbl. of crude oil and natural gasoline were produced, averaging 75,605 bbl. daily. In 1949 production totaled 20,246,466 bbl., or 55,470 bbl. daily.

In December 1950, production amounted to 79,872 bbl. daily, and in January 1951 production averaged an estimated 100,000 bbl. daily. Production this summer is expected to pass the 150,000-bbl. daily mark. At the end of 1950, Alberta oil wells had produced a cumulative 155,950,387 bbl.

Revenues.—Gross revenue from oil and natural-gasoline sales totaled $82,207,697, an average of $225,227 daily. This compares with 1949's total of $58,972,950, or $161,569 daily. Revenues in December 1950 totaled $7,239,183, or $233,522 daily. The 1951 daily average is expected to far surpass the 1950 total and cumulative revenues for that year of an estimated $346,112,776.

Natural gas.—Natural-gas production in the province totaled 82.2 billion cubic feet during 1950, compared with 58.97 billion cubic feet in 1949. Sales of gas to Alberta consumers were 51.45 billion cubic feet during the year, up from 42.29 billion cubic feet in 1949. Over 16.9 billion cubic feet of gas went into flare lines during 1950 compared with approximately 15.9 billion cubic feet in 1949, from oil wells which had no means of marketing the gas after oil-lifting tasks were completed.

Nearly 2.3 billion cubic feet of gas was restored to formations during the year, compared with 2.7 billion cubic feet in 1949. The balance of gas production went to field and plant use in various oil areas.

Crude deliveries.—Deliveries of Alberta crude to Prairie refineries increased during 1950, and volume of oil in field storage was greatly increased. The province's refineries during 1950 drew 13,751,385 bbl., compared with 11,328,561 bbl. in 1949. Saskatchewan refineries received 9,405,333 bbl. from Alberta during the year compared with 6,806,583 bbl., and Manitoba refineries drew 1,586,970 bbl. from Alberta in 1950, up from 1,196,671 bbl. in 1949.

Storage.—Field storage increased from 339,737 bbl. to 2,310,109 bbl. by the end of the year, and during 1951 each Prairie province will substantially boost the take of oil from Alberta wells. Marketing in Ontario and the United States' Midwest will start this spring on a big scale.

Drilling permits.—The Alberta Conservation Board issued a total of 1,168 permits for drilling of wells for oil or gas. This compares with 839 permits in 1949. During 1950 approximately 753 new oil wells were completed, compared with 512 in 1949. New gas wells placed on production totaled 19 during the year, compared with 14 in 1949, and another 19 potential gas wells were cased or capped. Total of abandoned wells in 1950 was 247, compared to the 207 abandoned in 1949.

At year's end, Alberta had 1,995 wells capable of oil production, with a total of 1,780 producing in December. A total of 303 wells were capable of gas production only, with 195 actually producing in December.

Petroleum Division Formed

OTTAWA.—Hon. C. D. Howe, minister of trade and commerce in the federal cabinet, has announced formation of a new petroleum division in his department to give Canada's expanding defense program top priority on available oil supplies. Dr. O. B. Hopkins, vice president of Imperial Oil, Ltd., has been loaned by his company to serve as division director.

While the new setup may ultimately lead to government control of oil supplies and oil and gasoline rationing, the immediate purpose is a concerted drive to step up oil production, refining, and transportation, and ensure that the defense program does not suffer for lack of oil. To this end, the director will keep in close touch with the United States Petroleum Administration for Defense in Washington, D. C.

New Research Lab

Final unit in Humble's extensive refining-research center at 260,000-bbl. Baytown plant now completed

Leigh S. McCaslin, Jr.

HOUSTON.—The last unit in Humble Oil & Refining Co.'s new refining-research center at the firm's 260,000-bbl. refinery at Baytown, on the Houston Ship Channel, has been completed.

A three-story research building, the final unit to be built, together with pilot units and service facilities in the adjacent area constitute the research center at the huge refinery. Approximately 450 persons are employed in the center and the operating budget for 1950 called for the expenditure of over $2,500,000.

Formal research was instituted at Baytown in 1924. The nucleus of the original organization was the handful of technically trained individuals who were concerned with processing difficulties after the refinery began operations in 1920. The early research workers contributed much to the development of vacuum distillation techniques, the treatment of lube-oil emulsions, and the design of thermocouples and heat exchangers.

The rapid growth of research at the plant can be illustrated by comparing earlier annual budgets with today's $2,500,000. During 1934 the cost of research work reached the $100,000 annual-expenditure level for the first time. By 1944 the cost had risen to $797,000.

Research results.—Much outstanding research has been carried on at Baytown, particularly on fractionation, alkylation, aromatics production, and premium-lubricant manufacture. The Baytown refinery was one of the first to install bubble towers. Later, Humble developed a "superfractionation" process capable of separating either special compounds for chemicals or high-octane from low-octane-gasoline fractions. A commercial superfractionation unit constructed on the basis of this research was responsible for the addition of some 8,000 to 9,000 bbl. a day to 100-octane aviation-gasoline production in World War II.

Humble's research in alkylation was instrumental in making it the first commercial producer of alkylate in the world in 1938. During World War II the Baytown plant was the largest single supplier of this major constituent of high-quality aviation gasoline.

Toluene.—In 1940 Humble began construction for the Government of a commercial plant to produce nitration-grade toluene for subsequent conversion to the explosive TNT. The design of this plant was based on the hydroforming process for making aromatic compounds from petroleum (a process originated by others) and superfractionation and solvent-extraction processes developed in Humble research. This application of the results of prior research made the company the nation's principal source of toluene during the last war. In addition, the plant provided byproduct xylenes and other materials that permitted a further increase in aviation-gasoline production.

In the field of lubricant manufacture, Humble researchers developed new techniques for the removal of undesirable asphalt and wax from crude oils which were a potential source of premium lubricants. These techniques were incorporated into a refinery unit, and this installation was later supplemented with solvent-extraction facilities.

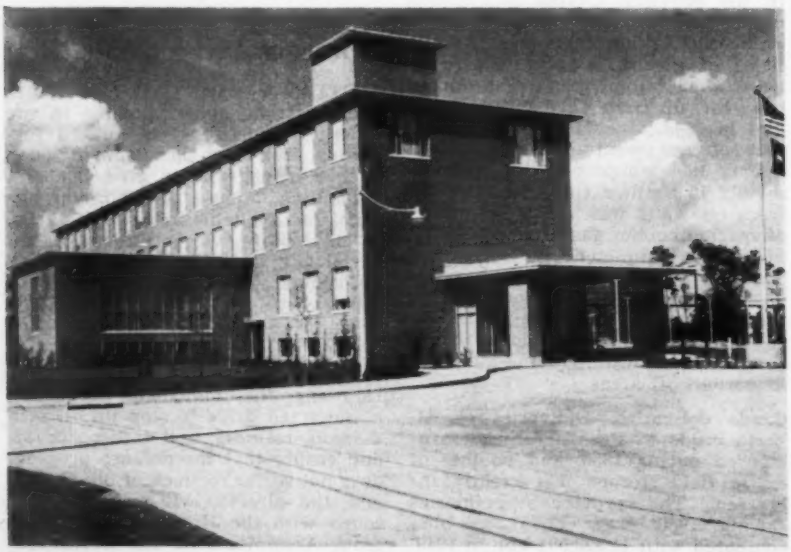
New research building. — Humble's new research building was planned by experienced designers of industrial-research laboratories. It contains 86 rooms consisting primarily of 22 by 28-ft. laboratories and 12 by 16-ft. offices. Two large conference rooms with combined meeting facilities for 100 people adjoin each other on the second floor. A lunch room and a library housing over 7,500 books and 40,000 patents are also provided.

Each laboratory in the building has several utilities, including tap water, 150-psi. steam, distilled water, 15-psi. natural gas, 90-psi. air, 150-psi. inert gas, and 110-volt a.c. electricity. Unlike ordinary office-building air conditioning, the air supplied to the laboratories is used only once and then exhausted to the outside. Thus, no air that could contain inflammable or toxic vapors reaches the rooms. Also, the spreading of odors through the building is minimized.

Types of research.—Four major types of research are carried on at the Baytown research center—fundamental, exploratory, analytical, and development. One of the principal fields for fundamental research is the study of catalysts. Some fundamental research is carried on through the support of specific projects at leading universities and other institutions.

The bench-scale equipment, with which exploratory research is usually conducted, functions in many respects as a "screening" apparatus. For those ideas that exhibit large potentialities, investigation in exploratory-research equipment becomes the forerunner of comprehensive studies which often require the use of large pilot plants.

Analytical research consists of the analysis of raw materials and products. Such instruments as the mass and emission spectrometers, the X-ray-diffraction unit, the polarograph, and the infrared and ultraviolet spectrophotometers are used in this work. Development research is carried out, generally, in large-scale pilot plants. Typical of Humble's equipment for development work are pilot units for studying the fluid catalytic cracking and sweetening processes, and laboratory facilities for investigating corrosion.



New refining-research building at Humble Oil & Refining Co.'s Baytown, Tex., plant.

NPC Committee Report

Any cut in depletion allowance might handicap increasing products output by 1,000,000 bbl. daily, group declares

Bertram F. Linz

WASHINGTON.—A National Petroleum Council committee made an interim report to Interior Secretary Oscar L. Chapman this week on the capital and materials requirements for an increase of 1,000,000 bbl. daily of oil products, and the burden of its report was that any reduction in depletion allowance, as proposed by the Treasury, might prove an insurmountable handicap to the attainment of that objective.

The committee report was released on the eve of hearings before the House ways and means committee at which representatives of the industry testified to the serious effects of any reduction in the present 27½ per cent deduction.

More exploration needed.—Signed by Robert E. Wilson of Standard Oil Co. (Ind.), chairman, the committee report declared that a steady increase in exploration and development will be necessary to maintain even the present productive capacity of some 6,000,000 bbl. daily.

"To provide a material portion of the proposed additional 1,000,000 bbl. daily will require the finding of new oil deposits with an ultimate yield of several billion barrels and will demand a still further large expansion of all phases of production activities; geological and geophysical exploration, drilling of wildcat wells, and rapid development of new fields when discovered," the report added.

"Most of the capital required for this purpose must be provided by the operations of the producing branch of the oil industry itself. This, of course, applies specifically to the independent operators who do the larger part of the country's wildcat drilling and whose activities are limited to the producing branch of the industry."

Great importance.—Percentage depletion for many years has been of the greatest importance in providing the country with a plentiful supply of low-cost oil products by attracting capital and enabling operators, large and small, to plow back income in order to continue and expand the search for new resources, Wilson pointed out.

"A reduction in percentage depletion as now proposed by the secretary of the treasury would automatically result in a serious curtailment of exploratory activities," he warned. "This would be directly contrary to the objectives of the Government as expressed at every recent meeting of the NPC by Secretary of the Interior Chapman, speaking as petroleum administrator for defense, who has consistently urged upon the industry a maximum exploratory effort."

Acted wisely.—Wilson explained that depletion was first provided by Congress at the end of World War I and, he said, that Congress acted wisely is evidenced by the fact that our estimated proved reserves are almost five times as large as at the end of 1918 notwithstanding an increase in consumption of nearly 400 per cent during the period.

At the same time, the retail price of gasoline, exclusive of taxes, is approximately 20 per cent less than the 1918 price for a greatly inferior product. If the allowance had not been established the oil industry would have adjusted itself to the situation—but there would have been less exploration, with consequent much lower reserves and producing capacity, product prices would have been higher, and dependence on foreign production would have steadily increased.

Independents would suffer.—"The tax proposals of the Treasury Department would seriously and adversely affect the exploratory and development activities of all elements within the industry, but would naturally fall most heavily on the smaller companies and independent operators who as wildcatters have discovered a large percentage of the nation's oil resources," Wilson said. "It is common practice among independent operators to have recourse to bank loans for the development of their producing properties. The adoption of the Treasury's proposals would seriously impair their ability to obtain such loans and to repay those now outstanding. Many operators would be thrown into bankruptcy or forced to sell their holdings at sacrifice prices."

"Death blow."—A cut in the allowance also would "deal a death blow" to a vast number of secondary-recovery operations, with permanent loss of an estimated several billion barrels of oil, Wilson added. All told, it would stifle the very activities which should be stimulated and increased to maximum extent and would definitely be inflationary in nature because of the higher product prices which would be required to offset the loss of depletion.

"If the Treasury Department's recommendations are followed and the inevitable result of this action shows itself in the dwindling of new discoveries and development work, the downward trend cannot then be reversed on short notice by a reinstatement of present tax measures," the report warned. "The search for oil is a continuing and long-term operation, involving geological and geophysical exploration, acquisition of long-term leaseholds, curing of titles, drilling of wildcat wells, etc. New oil fields cannot be found and delivered on short notice, no matter how great the urgency."

Treasury challenged.—The committee challenged Treasury claims that large additional revenue would result from a cut in depletion, pointing out the losses of revenue in other directions which would be directly caused, such as the reduction of exploratory and drilling work, losses of income by lease brokers and farmers, and the adverse effects on industries built up on the basis of cheap and abundant oil.

"Whatever the net amount of added revenue may be—if any—it will in any case amount to only a very minute fraction of the budget, and the price paid for an insignificant amount of additional tax collections would be a drastic curtailment of the exploratory effort of the industry and especially of the independent operator who in the past has been responsible for the finding of a very large percentage of the country's oil reserves," the report concluded. "This would occur at the very time when the oil industry is being urged by the Government to carry out a maximum amount of exploration as an important part of the country's defense program . . .

Profitable policy.—"Quite apart from the paramount question of national security through adequate oil supplies, and considered solely from the standpoint of production of revenue, the depletion provision which has been in effect for nearly a third of a century, far from entailing a loss of tax revenue, has in effect been a most profitable policy for the Government."

Strong support.—The NPC report was strongly supported by a number of producers who told the ways and means committee March 6 that a reduction in the depletion allowance would force many out of business within a few years.

Direct results of adoption of the treasury's proposal to reduce the allowance to 15 per cent, witnesses testified, would be the plugging of many marginal wells, curtailment of wildcat drilling, higher prices to consumers, abandonment of much secondary-

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WATCHING WASHINGTON

Bertram F. Linz

Tough Fight Ahead

Some members of Congress believe the fight to protect the oil and gas industries' 27½ per cent depletion allowance will be tough, but they are confident that the administration's proposal for a cut will be defeated.

The House ways and means committee, under strong pressure to raise an eventual $16,000,000,000 in additional taxes, heard representatives of the industries and congressmen from the oil-producing states this week. The spokesmen for oil and gas put up a good argument, actually the usual argument plus the added fact that the Government now must have additional oil as well as additional revenue and won't get the oil if it concentrates on the money and takes away the capital that finds new reserves.

There is no indication that the charges of tax profiteering lodged against the industry by the President and Secretary of the Treasury Snyder have influenced any of the older members of the committee who have voted on the question of depletion many times in the past and, in fact, the only men likely to get any new information out of the hearings are those in the freshman class.

The fight is tougher this year simply because of the defense situation and the administration's policy of government spending as usual. The committee is not expected to bring out a tax bill until the possibilities of cutting nondefense spending have been thoroughly explored and the chances are it will be considerably less than the President has asked for.

Even if the committee does the unexpected and reduces the depletion allowance, its action will have to run the gauntlet on the floor of the House, in the Senate finance committee, and on the Senate floor.

The Race Is On

They're off—not at Hialeah but in Washington.

Remember the general who reputedly wanted to buy up all the typewriters in the country at the outbreak of the last war so the Army could keep up with its paper work? And the order for 400,000 McClellan saddles to equip a cavalry with less than 5,000 horses?

According to Rep. Ken Regan of Midland, Tex., they're at it again.

There's a requisition out, according to Regan, for some 6,400,000 gal. of paint in 1-qt., 1-gal., and 5-gal. cans for quick delivery, reportedly for the Air Force; 58,000,000 yd. of cotton webbing for belts; 100 pipe organs (cost, $1,500 each), 800,000 lb. of black pepper, 13,000,000 can openers, and 22,000,000 pairs of boots.

Labor's Rebellion

Having pulled out of the defense agencies in protest over the handling of wage and manpower matters, the big question for labor now is, how is it to get back in, and for the administration, what effect will the split have politically.

Basis for the rebellion was the fact that labor wanted to control the wage and manpower situations although under the Defense Production Act its role is limited to a purely advisory one. Equally important was the fact that none of the labor heads on the Wage Stabilization Board wanted to sacrifice his lush job with his own union by voting for any wage formula the union would not like.

A lot of intramural politicking also is seen in the situation. The labor members were united in not liking Defense Mobilization Director Charles E. Wilson but individually they do not like each other on a much grander scale. Also, Labor Secretary Tobin is reportedly red hot at having lost manpower control to Wilson and may have contributed impetus to the walk-out movement.

At any rate, Eric Johnston, stabilization director, is going ahead, as he can legally, with the issuance of wage orders, and his first, recognizing the escalator clauses which Walter Reuther's automobile union has but which the CIO and AFL unions have in only a few cases, has created another situation which hasn't lessened the tension.

So far, Wilson hasn't paid too much attention to the wage matter and the labor group hasn't gone to the White House about it. But if labor does go to the President, and the President vetoes Wilson, the chances are good Wilson will quit, promptly, and also good that if he goes Johnston will go with him.

Now labor wants another whack at the ball by a revamping of the stabilization agency, but that would lead all the management members to resign and it would be impossible to get any top-flight industrialists to serve on a board openly dominated by the unions.

recovery work, slowing down of prospecting in the Gulf of Mexico, and concentration of industry operations in the big companies.

Thompson testifies.— Ernest O. Thompson, of the Texas Railroad Commission, declared that the country's oil-supply position is too tight to permit any tampering with incentives necessary for discovery of additional supplies of vitally needed oil. The situation is much tighter now than a year ago, he said, declaring that the time-proven depletion allowance is the "keystone" in the industry's production battle to find more oil.

Despite the tax concessions which the administration now seeks to withdraw, Russell B. Brown, general counsel of the Independent Petroleum Association of America, declared the oil industry not only has paid better wages than other industries and has kept the price of its products low but has also paid a larger percentage of taxes compared with sales than has other industry generally and has retained less as profit after taxes.

Serious effects seen.—Serious effects upon the nation's mobilization program were seen as an outgrowth of the cut by W. H. Geis, Los Angeles, consulting oil engineer, speaking for the Western Oil and Gas Association, the Oil Producers Agency of California, and the San Joaquin Valley Oil Producers Association.

"Unless a company's working capital can be preserved it cannot explore, drill, and develop new oil reserves to replace the oil that is produced," the committee was told by H. B. Fuqua, chairman of the board of Texas Pacific Coal & Oil Co., Fort Worth. "This is just another way of saying that unless the company can maintain its working capital it cannot long remain in business as a going concern."

Recovery endangered.— Recovery of four billion barrels of oil by secondary-recovery methods would be endangered by a reduction in the depletion allowance, it was asserted by Donald P. Oak, Tulsa engineer who cooperated in the first water-flood recovery project in the Mid-Continent area. Now starting, Oak said by way of illustration, is a $68,500,000 project in North Burbank field of Oklahoma which will add 140,000,000 bbl to recoverable reserves. In addition to halting secondary recovery, any adverse action would bring about the plugging of marginal wells which can be operated only by reason of the allowance, it was declared by Tom F. Grisham, president of Grisham-Hunter Corp., Abilene, Tex.

Offshore work.—On top of this, it was warned by W. H. Walshe, attorney for The California Co., New Orleans, the future of the search for submerged oil in the Gulf of Mexico is at stake.

Possibilities of a slowing down of

the development of states where large additional reserves may be found were outlined by James L. Duffy of Grove Hill, Ala., and Glenn E. Nielson, president of Husky Refining Co., Cody, Wyo.

The effect on price and the expansion of production sought by the administration was detailed by Harold Dicker, president of Houston Oil Co.; Maston Nixon, executive vice president of Southern Minerals Corp., and John R. Lynch, president of La Gloria Corp., both of Corpus Christi; and W. M. Vaughey, Jackson, independent producer.

Synthetic Fuels Urged

Interior Secretary Chapman asks prompt development of industry by private enterprise, with aid of Government

WASHINGTON. — Prompt development by private enterprise of a synthetic-liquid-fuels industry was called for last week by Interior Secretary Oscar L. Chapman.

In a 206-page report to Congress on the status of the department's synthetic-liquid-fuels program, Chapman said he was prepared to give full support to such an effort, for which government assistance is available under existing legislation.

"In view of the ever-increasing need for petroleum in the United States, the critical international situation threatening foreign supplies, the growing demands for steel, and the heavy costs to industry of constantly discovering and developing new fields," the secretary declared, "it is believed that the prompt development of a synthetic-fuel industry based on oil shale and coal is not only requisite to safeguard our oil supply but is an economically sound course for the foreseeable future. To neglect its development is to close our eyes and minds to our own resources at a time when they are needed critically. It also is apparent now that neither the Government nor industry would be taking any considerable economic risk in starting the initial plants, especially as measured against their potential value in meeting critical oil and chemical demands and in building a new industry in the West."

Competitive costs.—Chapman asserted that as a result of the department's research it is now believed that gasoline and oil can be produced from shale "at costs close to those for petroleum products" and with less requirement of steel and capital investment per barrel of capacity than is now needed by the petroleum industry.

"Oil-shale plants can be built in 1 to 2 years and enough reserves can be provided to permit operation at full capacity for 20 or 30 years," he said. "This contrasts sharply with petroleum operations in which the average oil field approaches depletion in 10 to 14 years and older fields must be replaced continually by the discovery and development of new reserves."

At the present time, the cost of producing gasoline from coal is somewhat greater than it is from shale, but in some instances the excess cost could be offset by the placing of plants near important consuming centers where product-transportation expense will be relatively low.

Costs worked out.—Detailed costs of production from both shale and coal have been worked out by the Bureau of Mines but will not be published until they have been checked by the National Petroleum Council, which is now engaged in a study. The report said, however, that the amount of steel required for initial construction per barrel per day of gasoline is about the same for coal hydrogenation as it is for petroleum. If the coal plant is used for 20 years, the actual amount of steel consumed per barrel of product made is less than that required for petroleum.

Chapman said the department will encourage the construction of one or two coal-hydrogenation plants and expressed the belief that if government assistance is required in their initial financing the funds will all be recovered with interest in relatively few years and if the prices of aromatic chemicals continue to rise the plants will be a "most profitable" business venture.

Cites big demand.—"During the past few years," Chapman said in arguing the point, "demand for such aromatic chemicals as benzene and phenol has outstripped productive capacity. These materials are used in plastics, nylon, insecticides, and many other essential chemical products. Benzene requirements increased still further when the synthetic-rubber plants were reopened, for it is used to make styrene, which is one of the basic components of synthetic rubber. The shortage of benzene is now acute and its price has been advancing rapidly.

"This situation creates favorable economic conditions for the construction and operation of one or two coal-hydrogenation plants. Along with gasoline, such plants can produce a high percentage of aromatic chemicals. A total hydrogenation capacity of 30,000 bbl. a day, for example, would increase the country's benzene production by about 20 per cent, its phenol output by about 11 per cent, and provide substantial amounts of toluene and xylene for aviation fuels, as well as a new source of motor gasoline and liquefied petroleum gas.

Quick payout. — At November 1950 prices for the chemicals, gasoline, and other products, the secretary estimated, a coal-hydrogenation plant would pay out in about 10 years, after provision is made for sales expense, management, interest, taxes, and all direct operating costs.

The gas-synthesis process on which the bureau is conducting research, the report stated, is progressing but is not sufficiently advanced to allow for any conclusions as to time and degree of commercialization. A demonstration plant which uses coal as a raw material is due for completion early this year, and one commercial plant of 7,000 bbl. per day capacity has been constructed by private industry to use natural gas as the starting material.

Cox Joins PAD Temporarily

WASHINGTON.—W. Phillip Cox, formerly with Gulf Oil Co. and Socony-Vacuum Oil Co., Inc., and now engaged in practice as an engineering consultant here, is acting assistant director and head of the foreign materials branch of the materials division of the Petroleum Administration for Defense.

Cox, who was associated with the Petroleum Administration for War in a similar capacity, joined PAD on a temporary basis to help get the organization rolling and will return to his own practice in the near future.

Compact Extension Asked

WASHINGTON. — Legislation extending the life of the Interstate Oil Compact for another 4 years, to September 1, 1955, was introduced in Congress March 5 by Sen. Tom Connally of Texas.

"The Interstate Oil Compact Commission has been notably successful in bringing about cooperation among the states for the conservation of oil and gas," Connally told the Senate. "With the national-defense program making greater demands every day on these resources it becomes more important than ever that this work be continued and intensified."

Connally explained that he introduced the legislation this far in advance of the body's expiration date next September so that there shall be no uncertainty regarding the future of the program. The 20 member states have already agreed to the extension, but congressional action is necessary because of a prohibition upon the making of agreements between states without the sanction of the Federal Government.

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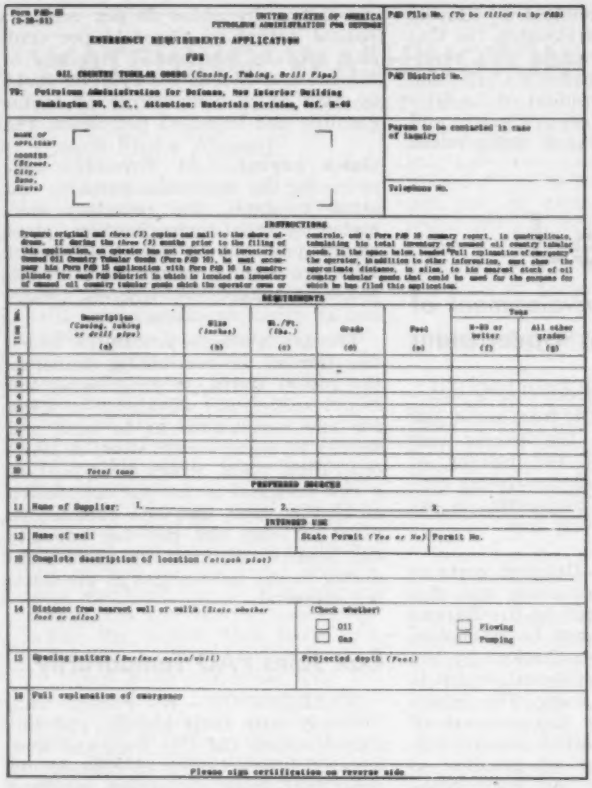


Form PAD-15 (3-26-51) UNITED STATES OF AMERICA PETROLEUM ADMINISTRATION FOR DEFENSE

EMERGENCY REQUIREMENTS APPLICATION FOR OIL COUNTRY TUBULAR GOODS (Casing, Tubing, Drill Pipe)

PAD File No. (To be filled in by PAD)

PAD District No.

TO: Petroleum Administration for Defense, New Interior Building, Washington 25, D.C., Attention: Materials Division, Ref. M-46

NAME OF APPLICANT

ADDRESS (Street, City, Zone, State)

Person to be contacted in case of inquiry

Telephone No.

INSTRUCTIONS

Prepare original and three (3) copies and mail to the above address. If during the three (3) months prior to the filing of this application, an operator has not reported his inventory of Unused Oil Country Tubular Goods (Form PAD 16), he must accompany his Form PAD 15 application with Form PAD 16 in quadruplicate for each PAD District in which is located an inventory of unused oil country tubular goods which the operator owns or controls, and a Form PAD 16 summary report, in quadruplicate, tabulating his total inventory of unused oil country tubular goods. In the space below, headed "Full explanation of emergency" the operator, in addition to other information, must show the approximate distance, in miles, to his nearest stock of oil country tubular goods that could be used for the purpose for which he has filed this application.

REQUIREMENTS

Item No.	Description (Casing, tubing or drill pipe) (a)	Size (Inches) (b)	Wt./Ft. (lbs.) (c)	Grade (d)	Feet (e)	Tons: Grade H-40 or better (f)	Tons: All other grades (g)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10	Total tons						

PREFERRED SOURCES

11 Name of Supplier: 1. 2. 3.

INTENDED USE

12 Name of well | State Permit (Yes or No) | Permit No.

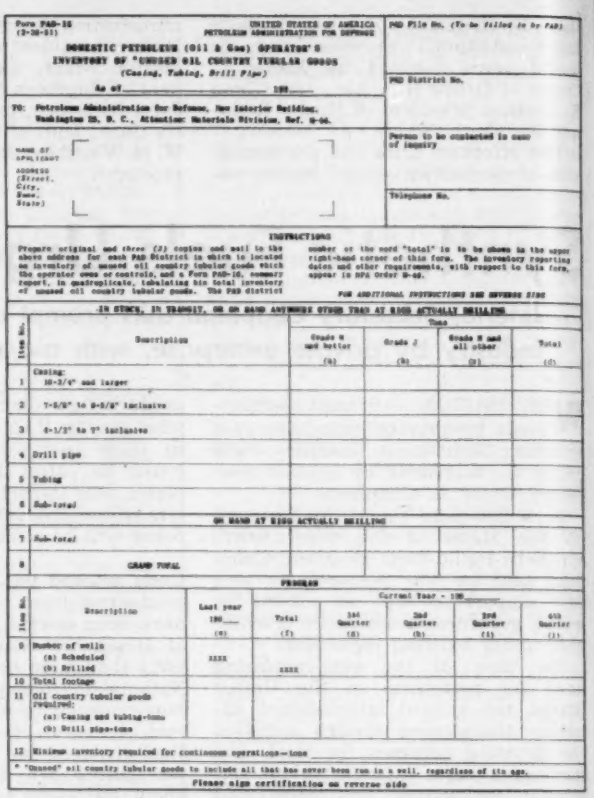
13 Complete description of location (attach plat)

14 Distance from nearest well or wells (State whether feet or miles) | (Check Whether) Oil Gas Flowing Pumping

15 Spacing pattern (Derrick area/well) | Projected depth (Feet)

16 Full explanation of emergency

Please sign certification on reverse side



Form PAD-16 (3-26-51) UNITED STATES OF AMERICA PETROLEUM ADMINISTRATION FOR DEFENSE

DOMESTIC PETROLEUM (Oil & Gas) OPERATOR'S INVENTORY OF "UNUSED OIL COUNTRY TUBULAR GOODS (Casing, Tubing, Drill Pipe)

As of _____ 195_

PAD File No. (To be filled in by PAD)

PAD District No.

TO: Petroleum Administration for Defense, New Interior Building, Washington 25, D. C., Attention: Materials Division, Ref. M-46.

NAME OF APPLICANT

ADDRESS (Street, City, Zone, State)

Person to be contacted in case of inquiry

Telephone No.

INSTRUCTIONS

Prepare original and three (3) copies and mail to the above address for each PAD District in which is located an inventory of unused oil country tubular goods which the operator owns or controls, and a Form PAD-16, summary report, in quadruplicate, tabulating his total inventory of unused oil country tubular goods. The PAD district number or the word "total" is to be shown in the upper right-hand corner of this form. The inventory reporting dates and other requirements, with respect to this form, appear in NPA Order M-46.

FOR ADDITIONAL INSTRUCTIONS SEE REVERSE SIDE

IN STOCK, IN TRANSIT, OR ON HAND AT RIGS ACTUALLY DRILLING

Item No.	Description	Tons: Grade H and better (a)	Tons: Grade J (b)	Tons: Grade H and all other (c)	Total (d)
	Casing:				
1	10-3/4" and larger				
2	7-5/8" to 8-5/8" inclusive				
3	4-1/2" to 7" inclusive				
4	Drill pipe				
5	Tubing				
6	Sub-total				
	ON HAND AT RIGS ACTUALLY DRILLING				
7	Sub-total				
8	GRAND TOTAL				

PREMIER

Item No.	Description	Last year 19__ (e)	Current Year - 19__: Total (f)	1st Quarter (g)	2nd Quarter (h)	3rd Quarter (i)	4th Quarter (j)
9	Number of wells (a) Scheduled (b) Drilled	XXXX	XXXX				
10	Total footage						
11	Oil country tubular goods required: (a) Casing and tubing-tons (b) Drill pipe-tons						
12	Minimum inventory required for continuous operations—tons						

* "Unused" oil country tubular goods to include all that has never been run in a well, regardless of its age.

Please sign certification on reverse side

FORMS FOR STEEL.—From now on all oil and gas operators must fill out forms like these to get tubular goods for drilling. Form PAD-15 is for wildcats and emergencies. PAD-16 is an inventory report which all operators must file. A third form, PAD-17, must be used for regular supplies every quarter, beginning March 31.

Steel Forms Issued

Applications to be used by all oil and gas operators to obtain priorities for tubular goods being distributed

WASHINGTON.—Forms to be used by oil and gas operators to obtain priorities for oil-country tubular goods are now being distributed by the Petroleum Administration for Defense, and many oil - well - supply houses are stocking supplies of the forms for the convenience of their customers.

General use of the forms was described in *The Oil and Gas Journal* of *February 22, page 124*, but detailed instructions are contained inNPA Order M-46 which is being issued by the National Production Authority and which is scheduled to be published in the Federal Register this week.

Three forms.—Three different forms are involved in the M-46 procedure, PAD-15, PAD-16, and PAD-17. The first is for emergency requirements, the second is an inventory report, and the third is to obtain regular quarterly requirements for casing, tubing, and drill pipe.

The new procurement system which requires use of these forms goes into effect April 1, but operators are urged to start filing the forms immediately.

Form PAD-15, "Emergency Requirements Application for Oil-Country Tubular Goods," is in connection with the so-called "set-aside program" whereby supply houses reserve 5 per cent of their tubular goods for wildcat drilling and emergency uses. Between 6,000 and 7,500 tons per month will be available under PAD-15, primarily for drilling or completing oil or gas wells. To the extent that the entire set-aside is not used for wildcatting, suppliers may make deliveries on PAD-15 to operators who do not have tubular goods in stock or otherwise available to them to meet offset or other drilling obligations.

Deadlines near. — The inventory report, PAD-16, must be on file with PAD before PAD-15 will be acted on, and so should be sent with the first PAD-15 or ahead of it. The first inventory date is March 10, and PAD is requesting all operators to file PAD-16 by March 17 whether or not they expect to need to use the emergency PAD-15 procedure. Thereafter the inventory form must be filed every 3 months for use with the PAD-17 or "Quarterly Requirements Statement."

This third form, PAD-17, will be the only means whereby an operator can obtain new supplies of casing, tubing, and drill pipe during the third quarter of 1951 and subsequently (except for the emergency PAD-15 procedure). It must be filed with PAD 3 months in advance of the period during which the tubular goods are to be purchased. The first one, therefore, must be filed by March 31, and it must be accompanied by or preceded by the inventory form, PAD-16.

Forms simple. — Each of the three forms is relatively simple and is confined to a single page. The back of each form contains instructions and space for remarks and signature. All forms must be filed in quadruplicate. Users or others may reproduce the report blanks so long as they conform to the official size and format.

Drilling supplies.—PAD is still working on procedures for obtaining drilling supplies other than tubular goods, and details are expected to be announced soon. Also still in the works are plans for allocating steel and other supplies for refining, natural-gasoline plants, pipe lines, and other facilities for the oil and gas industry.

Gas Storage

Permit for condemning of land under Gas Act asked

WASHINGTON.—Legislation which would extend provisions of the Natural Gas Act granting eminent domain for pipe lines to permit the condemnation of land for the storage of gas was introduced in Congress last week by Sens. Paul H. Douglas and Everett M. Dirksen of Illinois.

Douglas pointed out that the natural-gas industry grew up on a current-demand policy under which all gas moving through a pipe line was immediately consumed, necessitating the sale of large quantities of gas for industrial use during the summer months. But, he said, this practice is no longer adequate to compensate for the tremendous growth in demand by domestic consumers during the winter months, and in some areas expansion of service has been halted since it is not economic to build long-distance lines if the full capacity is to be utilized only during a few months in the year.

Can be solved.—"The situation can be solved by the development of storage facilities near the market," Douglas explained. "If available, the gas not needed by the present domestic consumers in the summertime may be diverted to storage and, by means of additional pipe lines of short distance, may be economically delivered to additional customers as and when needed. As the gas must be stored in tremendous volumes, such storage is generally economically feasible only in natural reservoirs. A number of depleted oil and gas fields which happen to be located near consuming centers are at present utilized as storage fields. It is now believed that gas may be stored in natural reservoirs in which only salt water is now contained."

Facilities urged.—The Federal Power Commission has urged the industry to develop storage facilities, the senator said. So far, Michigan, Kentucky, and West Virginia have passed acts authorizing condemnation for underground storage, but "it is an inevitable concomitant of federal regulation of the industry that a federal right to condemn for storage purposes be granted to all projects nationally authorized.

"Private negotiation is highly inadequate for the purpose," Douglas said. "Underground storage requires that storage rights be obtained in the entire area in whose underground strata the gas is to be stored. No landowner should be in a position to take gas belonging to others and destined for public use, which may be stored under his land. A single recalcitrant owner could prevent the use of the reservoir. In any event the cost of acquisition would be subject to the demand of the landowners, without regard to reasonable value.

"It is entirely appropriate that eminent domain be granted for storage facilities which the Federal Power Commission has found required by public convenience and necessity, and Congress should encourage the development of such storage projects by amending the Natural Gas Act as proposed."

New Orders

Agencies issue rules on use of various materials

WASHINGTON.—The following orders have been issued by the mobilization agencies:

Petroleum Administration

PAD Order No. 1, February 27: Establishing an allocation system for tetraethyl lead fluid.

National Production Authority

Delegation 9, February 26: Giving the Petroleum Administration jurisdiction over certain chemicals used principally by the oil industry.

Amendment to Regulation 2, February 27: Revoking priority provided for certain industrial equipment.

Regulation 4, February 27: Providing priority for the procurement material and equipment for maintenance, repair, and operation.

Amendment to Order M-12, February 27: Modifying the basic copper-conservation order to permit use of copper fins in heating and ventilating equipment until April 30.

Amendment to Order M-14, February 28: Revising the basic nickel-conservation order to permit use of nickel held in inventory after March 1.

Amendment to Order M-35: February 28: Establishing an allocation system for hides and skins.

Order M-40, February 28: Setting up a system for pooling orders for machine tools.

Order M-41, February 28: Providing for equitable distribution of machine tools among manufacturers working on direct mobilization contracts.

Amendment to Order M-32, March 1: Requiring producers of barium carbonate to set aside 20 per cent of scheduled output for defense orders.

Amendment to Order M-1, March 1: Increasing from 15 to 20 per cent the proportion of monthly shipments required to be set aside for DO-rated orders by manufacturers of carbon and alloy-steel plates, beginning in May.

Order M-42, March 2: Requiring that producers of screen wire shall accept DO-rated orders up to 10 per cent of their monthly production.

Order M-43, March 2: Limiting manufacturers' acceptance of defense rated orders for construction machinery to 50 per cent of the average monthly shipments during the 6-month period ended June 30, 1950, unless otherwise directed by NPA.

Amendment to Order M-2, March 2: Increasing the amount of rubber available for civilian consumption to approximately 90,000 long tons monthly for March and the second quarter.

WEST COAST

Steel Needs

PAD official says they are better understood now

D. H. Stormont

BAKERSFIELD.—The necessity of providing steel for oil production is far better understood now than at the beginning of World War II and the present program is designed to assure adequate supplies, Bruce K. Brown, deputy petroleum administrator, told the San Joaquin Valley Oil Producers Association February 28.

Allocating authorities and officials of the Defense Department seem thoroughly alert to the oil industry's steel problems and know that the oil and gas programs cannot be carried out unless steel is kept flowing to them, Brown said.

No backlog.—An unfavorable circumstance, he added, is that we started World War II with a comfortable backlog of excess capacity to produce crude oil so that the failure to maintain an adequate drilling program did not make itself felt until 1945, whereas now we have no such backlog and failure to sustain an adequate drilling program would be felt almost immediately in this emergency.

"We in the Petroleum Administration have convinced the National Production Authority that we must drill 43,400 wells this year and that 1,890,000 tons of oil-country tubular goods must be made available to do the job," Brown told the producers. The NPA is providing a program to the mills to roll at that rate beginning in April 1951, and one of PAD's jobs is to work with NPA to make certain that those rollings continue in subsequent months.

Works developing.—"In cooperation with NPA we are developing detailed mechanisms for the equitable distribution of oil-country tubular goods to operators commencing in July. We hope to be able to announce the full details of these plans within 30 days.

Accompanied by R. G. Lawton, PAD director of production, Brown discussed details of the steel-procurement program with producers at the meeting and also at subsequent gatherings of producers at Taft, Santa Maria, and Ventura.

First executive committee of the Rocky Mountain Section of American Association of Petroleum Geologists. Front row, left to right: W. A. Bramlette, secretary-treasurer; Max L. Krueger, president; and Alex Clark, vice president. Back row, left to right: L. J. Fulton, Montana representative; John R. Fanshawe, Wyoming representative; C. D. Johnson, New Mexico representative; and Frank Neighbor, Utah representative. The Colorado representative, A. W. Cullen, was not present when this picture was taken.

Geologists Meet

Future possibilities, "pure geology" discussed at first annual meeting of Rocky Mountain Section, A.A.P.G.

Philip C. Ingalls

DENVER.—The rapid increases in exploration activity, development, and production in the Rocky Mountain area during the past 10 years, and the expectations of continued growth based on the projected completion of new pipe-line outlets within the next year, was reported by Maury Goodin, Petroleum Information, Inc., Denver, in the lead-off paper at the first annual meeting of the Rocky Mountain Section of the American Association of Petroleum Geologists held here March 1-2.

The increases pointed out by Goodin account for the unexpectedly large attendance of geologists from the Rocky Mountain states and scattered points throughout the western portion of the country. Although original expectations were that between 200 and 300 would attend there were 650 geologists registered at the final tally.

The meeting was opened by the president of the section, Max L. Krueger, consulting geologist, Laramie, who told of the chartering of the section last April, the section's aim of holding annual meetings for the discussion of pure geology as it is used to find oil in the Rockies, and the future plans of the section, which including holding next year's meeting in Salt Lake City and the 1953 meeting at Casper.

Later Krueger conducted an election of officers for the coming year and announced these results: A. J. Eardley, University of Utah, president; Charles S. Lavington, consultant, Denver, vice president; and Charles A. Hauptman, United States Geological Survey, Salt Lake City, secretary-treasurer.

Wyoming fields.—The initial technical papers of the meeting were devoted to the geology of the most active fields in Wyoming: Sussex, Glenrock, Slick Creek, and Beaver Creek. Papers on these fields were prepared by Casper geologists W. G. Olson and Ruth Bachrach, Continental Oil Co.; W. H. Curry, Far West Oil Co.; I. E. Harris, General Petroleum Corp.; and C. C. Stiteler, Stanolind Oil & Gas Co., respectively. J. D. Love, U.S.G.S., Laramie, showed that there is an apparent relationship between zones of stratigraphic thinning and the known oil fields of Wyoming.

(Digests of these and other papers will appear in the March 22 issue of The Oil and Gas Journal.)

Utah areas.—Verne E. Farmer, Carter Oil Co., Vernal, who worked through the original disappointing tests in the Uinta basin, reported on the discovery of oil in the Tertiary-Green River formation in that now-promising basin. George H. Hansen, Brigham Young University, traced the history of oil and gas development through the 600 wells that have been drilled since the first well was completed in 1891. Paleozoic stratigraphy of the Great basin with emphasis on the better known eastern trough, where an intensive search for oil is now in progress, was discussed by W. L. Stokes, University of Utah. Harold J. Bissell, Brigham Young University, presented a paper on the stratigraphy and structure of the northeastern Strawberry quadrangle, where 38,000 ft. of sedimentary strata (upper Pennsylvanian through Eocene) is exposed. Sherman A. Wengerd, University of New Mexico, told of his study of eight bioherms in reefing limestones of the Hermosa formation that have been breached by the San Juan River in Utah.

Denver basin.—A suggested correlation of the Cretaceous rocks of western Nebraska which are causing so much confusion was made by George R. Veronda, Ohio Oil Co., Casper. The history of exploration which led to seven discoveries in northeastern Colorado was reviewed by Harry L. Thomsen, Shell Oil Co., Denver. Alex W. McCoy, III, Gulf Oil Corp., Tulsa, reconstructed the geological history of the Denver basin in his paper which included isopachous and facies maps.

Colorado plateau.—Some of the results of an intensive study of the Upper Jurassic-Morrison formation in western Colorado and southeastern Utah on behalf of the Atomic Energy Commission were summarized in a paper by L. C. Craig and Clifford N. Holmes, U.S.G.S., Craig, Colorado.

San Juan basin.—Statistics on exploratory and development drilling in the San Juan basin area were presented by Paul H. Umbach, Stanolind Oil & Gas Co., Albuquerque. This paper was followed by one prepared by Caswell Silver, consultant, Albuquerque, on the stratigraphic oil and gas possibilities in northwest New Mexico and southeastern Colorado. *(Notes on these and other papers are made on page 127 of this issue.)*

Field trips.—Last year's field trips of the local geological associations of the Rocky Mountain area were reviewed, principally by the means of Kodachromes. W. W. Rubey, U.S.G.S., Washington, D. C., who also presented his "Development of the Ocean and Atmosphere," an A.A.P.G.-sponsored distinguished lecture, at a dinner meeting told of the Wyoming Geological Association's first field trip in southwestern Wyoming. The Billings Geological Society's field conference through southwestern Montana was reviewed by L. S. Gardner, U.S.G.S., Billings. Orlo E. Childs, Phillips Petroleum Co., Salt

Lake City, reviewed the trip of the Intermountain Association of Petroleum Geologists through the Uinta basin last year.

Correlations.—The recognition of persistent units of the Mississippian-Madison formation in the Big Horn and Wind River basins, Wyoming, by means of field data was discussed in a paper by M. E. Denson, Jr., California Institute of Technology, and Norman S. Morrisey, Stanolind Oil & Gas Co., Tulsa. L. L. Sloss, Northwestern University, told of regional correlations in the Devonian of Wyoming, Montana, Alberta, and Saskatchewan, which he and John M. Andrichuk, also of Northwestern, had studied and divided into four units for analysis of the complex stratigraphic problems involved. A. J. Crowley, The Texas Co., Denver, told how the use of distinctive microfauna found in Cretaceous shales in the Rockies permitted wide regional correlations both on outcrops and in the subsurface.

Kenneth P. McLaughlin, University of Montana, said that results of a survey of porosity and permeability data available from existing literature, though incomplete, verify the existing belief that the depths from which oil may be produced will be governed primarily by the depths to which sedimentary troughs have been filled and by progress in deep-drilling techniques.

SOUTHWEST

Texas Oil Taxes

Oil and gas industry paid in more than 30 per cent of all state taxes in 1949, association spokesman reports

Leigh S. McCaslin, Jr.

AUSTIN.—A spokesman for the oil and gas industry told a legislative committee here last week that the industry is paying more than its fair share of Texas taxes.

Andrew M. Owsley, of Dallas, general counsel of the Texas Mid-Continent Oil and Gas Association, said oil and gas paid $108,765,000 into the state treasury last year, (see Table 1), or more than 30 per cent of all taxes collected. Owsley's testimony was not related to any bill before the legislature, but was in connection with the plan of the governor and the legislature to study "who is paying taxes" in Texas.

As proof that the industry's share of taxes is too large, Owsley pointed out that of total income payments to individuals in 1949, the petroleum and allied industries accounted for only 12 per cent. "This indicates," said the lawyer, "that some rather large economic forces are at play in Texas other than that provided by oil and gas." He also called attention to the University of Texas Bureau of Business Research Index of Texas Economy which gives the industry a weight of only about 13 per cent.

Burden shifts.—Owsley said that in a single decade burden of government cost has "shifted more and more onto the oil and gas operators." In 1940, production taxes alone on crude oil and natural gas accounted for 11.6 per cent of the total net cost of Texas state government. At the present time, the figure is over 30 per cent. (See Table 2). Stated another way, Owsley said that the cost of government has more than doubled in the 1940-49 period while the petroleum industry's share in the cost has tripled.

TAXES PAID AT STATE LEVEL BY TEXAS OIL AND GAS OPERATORS

Crude-oil-production tax	$ 81,368,000
Crude-regulatory tax	1,375,000
Natural-gas production	10,042,000
Ad valorem	10,496,000
Franchise tax	2,904,000
Well servicing	483,000
Carbon-black manufacturing	2,097,000
Total	$108,765,000

The House committee on revenue and taxation, before which the Mid-Continent lawyer appeared, also has on file a report by the Texas Legislative Council on the petroleum industry. This report suggests that crude-oil taxes cannot carry the burden as much in the future as they have in the past. Noting that the crude-production tax fluctuates with the demand for crude, the report said:

"The oil tax functions efficiently as compared to other taxes; it collects very sizable revenues. Yet it presents at least one fundamental defect as a continuing substantial money-making segment of the state's tax structure—the dependence of present production-control measures upon factors over which the state has no control."

Importance noted.—In connection with his tax discussion, Owsley pointed out the great importance of Texas to the present national emergency. He reminded his listeners that the state provided about 75 per cent of the national increase in crude production during World War II. He said the industry must have three things in order to meet any increase brought about by the Korean war:

1. Sufficient venture capital to finance such an expansion program.
2. Have available the necessary material, such as steel; and
3. Have an industry not unduly burdened with taxation and government regulations and controls.

Royalty Shares Purchased

FORT WORTH.—John J. Reynolds, Inc., a New York real-estate firm, has purchased 23,983 of a total of 29,000 outstanding shares of Federal Royalties Co., Inc., for a sum in excess of $5,000,000, according to John J. Reynolds, head of the former firm.

The company owns 18,750 royalty acres with 1,627 oil-producing wells. Production to the royalty interests last year amounted to 400,000 bbl. of oil. Included in the interests is a percentage of Goldsmith field in Texas which is operated under a leasing arrangement by Gulf Oil Corp.

Subsidiary Company Formed

MIDLAND, Tex.—State Exploration Co., Los Angeles, has announced the opening of a subsidiary company, State Exploration Co. of Texas, with headquarters in Midland.

F. E. Swenson, formerly manager of the land department for Deep Rock Oil Corp., is president of the new concern, and W. H. Conkling, formerly regional geologist for Sun Oil Co. here, is vice president and chief geologist. Also vice president and assistant chief geologist is James R. Day, who leaves the position of manager of exploration for Pan American Oil Co. in West Texas.

TABLE 2—PRODUCTION TAXES ON TEXAS NATURAL RESOURCES COMPARED TO COST OF STATE GOVERNMENT

Fiscal year ending Aug. 31	Total government cost	Less federal aid	Net state cost* (Col. 1 less Col. 2)	Prod. taxes on crude oil and nat. gas	Pct. of Col. 3	Prod. taxes on all natural resources†	Per cent of Col. 3
1940	$165,718,000	$24,697,000	$141,021,000	$16,335,000	11.6	$19,023,000	13.5
1941	166,073,000	29,988,000	136,085,000	18,339,000	13.5	21,561,000	15.8
1942	205,742,000	39,424,000	166,318,000	27,085,000	16.3	32,236,000	19.4
1943	181,796,000	44,751,000	137,045,000	28,832,000	21.0	33,459,000	24.4
1944	182,234,000	38,599,000	143,635,000	39,006,000	27.2	43,219,000	30.1
1945	186,493,000	37,716,000	148,777,000	44,152,000	29.7	49,284,000	33.1
1946	238,616,000	44,862,000	193,754,000	42,559,000	22.0	48,914,000	25.2
1947	319,988,000	87,749,000	232,239,000	61,088,000	26.3	68,413,000	29.5
1948	403,984,000	113,991,000	289,993,000	94,752,000	32.7	103,289,000	35.6
1949	443,777,000	124,252,000	319,525,000	97,821,000	30.6	106,529,000	33.3

*Net cost to be borne from state taxes. †Including crude oil, natural gasoline, cement, sulfur, carbon black, and well servicing.

Source: Records of Comptroller of Public Accounts.

MIDDLE EAST

Price Attack

New efforts of ECA against prevailing price structure in Persian Gulf area are reported in industry circles

Dahl M. Duff

NEW efforts of the Economic Cooperation Administration against the prevailing price structure in the Persian Gulf are reported in industry circles.

Officials of the agency in Washington are now seeking to establish that the competitive crude price has been not the ruling and accepted $1.75 a barrel but rather the somewhat lower figure at which Arabian American Oil Co.'s owning companies are billed for Aramco crude.

Proceeding on this basis, the ECA has told the companies it believes it is due sums representing the difference between the price at which it financed shipments and the Aramco intercompany price. The amount involved was not disclosed but it was said to be a very substantial sum.

Resistance noted.—The companies involved are understood to be firmly resisting this latest effort of the Washington agency to upset the recognized price level in this region which is the prime source of oil supply for the Eastern Hemisphere. Company officials have given the ECA their position in conferences in Washington, and it is reported further material is yet to be presented.

The ECA has audited its records back to May 1949 to determine what could be assessed, on the basis of a lower crude price. As yet no formal claim has been made against the companies, but in first raising the question, it mentioned an audit from May to September 1949. It is now understood the records have been checked up to August of last year.

Under ECA procedure, supplying companies in obtaining reimbursement in dollars furnish a certificate to the effect that they have, to the best of their knowledge and belief, abided by all ECA regulations. These regulations include a requirement that shipments be made at the competitive price existing in the area.

Justification doubted.—Company officials are represented as feeling the position of the ECA is completely without justification and that the $1.43 a barrel at which Aramco's partners pay their producing subsidiary on a long-term-contractual basis cannot in any way be considered as being the competitive price. This latter price has been established at $1.75 not only in sales made by the Aramco companies but also by other Persian Gulf suppliers, including those from Kuwait and Iran.

The ECA told the companies that it did not previously know of the existence of the intercompany Aramco arrangement and is now taking action because of this. This contention has raised a fundamental objection to the way in which ECA operates, namely that its decisions are subject to retroactive change. One official said that ECA, along with the foreign governments concerned and other buyers of Middle East oil, have all along accepted the $1.75 but now comes in and questions transactions taking place as far back as 2 years.

Studies made.—The ECA assisted by a consultant panel has made recurrent studies of the Persian Gulf oil-price structure. When the agency first began operating, these prices were around $2.12 a barrel f.o.b. They came down to the current $1.75 in two major changes over the last year and a half. ECA also has raised questions regarding the f.o.b. price of products in the Persian Gulf, on grounds that the spread between them and the price of the crude was too great.

Last summer, the agency ordered reductions in the price of products it financed for delivery to Mediterranean destinations. This brought vigorous protests from the companies, and the result was that the affected companies ceased the relatively small movement from the Persian Gulf into this area. Among other things, the companies at that time objected that the ECA was not set up as a price-fixing agency and had gone beyond its function. The same objection is made to the agency's present action in which it is questioning accepted commercial transactions.

Actually, in oil sales, the companies deal with the participating foreign governments and not with ECA directly. A European subsidiary of one of the Persian Gulf companies, for example, buys crude f.o.b. the Persian Gulf. In Europe, it puts up the cost of this oil in local currency to the government concerned, and this particular government is able, through ECA assistance, to furnish the required dollars so that payment may be made to the American supplying company.

Implications.—There are a number of significant implications to the latest move of the ECA officials in Washington. If they were successful in forcing through a lower price for Persian Gulf crude, it would certainly widen the area in which this oil is competitive and place it in a better position in the Western Hemisphere as against Gulf Coast and Venezuelan production.

Also related to this latest attack on the Persian Gulf crude price is the matter of the price at the Sidon, Lebanon, terminal of the Trans-Arabian pipe line. The companies sharing in the throughput of the line initially listed slightly differing f.o.b. prices for crude at Sidon but subsequently these came down to the common level of $2.41.

Shipments made.—First shipment of oil from Sidon under ECA is reported to have been made to Italy, but since then it has been sent to other destinations. It still is not known whether ECA will approve the Sidon price, and the agency is reported to have said that these transactions will be subjected to "post-audit." The Sidon price as it now stands equals the f.o.b. Persian Gulf price plus certain tanker rates from the Persian Gulf to Sidon.

Ultimately Eastern Mediterranean region around Sidon is expected to become a fully independent basing point for crude shipments. There is considerable interest in what position ECA will eventually take in regard to the current Sidon price. It is felt that the method initially used to arrive at this price is the only logical one that could be followed at the present time, and one official commented that he certainly did not believe the ECA wants to take over the job of running the Trans-Arabian pipe line.

LATIN AMERICA

New Lube Plant

Salamanca facility will produce 1,500 bbl. daily

PLANS for construction of a new modern lubricating-oil plant at the Salamanca refinery of Petroleos Mexicanos have been disclosed in Mexico City.

It is reported that Pemex officials are considering a lubricants plant with a capacity on the order of 1,500 bbl. daily. Though no contract has been let, facilities are expected to include propane deasphalting, methyl-ethyl ketone dewaxing, furfural refining, and possibly clay contacting.

Production from the plant would sharply reduce expenditures now made by the Mexican agency for pe-

troleum-product imports. About half the revenue earned by Pemex from the export sale of petroleum, mostly crude and fuel oil, goes to pay for imports of lubricants and related products.

Would handle needs.—Capacity of the proposed lubricating-oil plant would more than cover Mexico's total requirements, though some specialty types would still have to be bought from the United States. During 1950, Pemex imported 321,940 bbl. of lubricants of all types. The Salamanca refinery is a 30,000-bbl. daily refinery opened last summer. Crude is supplied by pipe line from Poza Rica.

Pemex also is anxious to reduce expenditures made for asphalt imports which in 1950 amounted to 102,716 bbl. A report in Mexico City was that a group of United States investors is proposing to reopen a group of shut-in wells near Tampico and use the old La Norma refinery, about 28 km. from Tampico, to manufacture asphalt from the 14°-gravity crude for Pemex on a percentage basis.

Overhauls planned.—Pemex announced in Mexico City that three of its refineries will be overhauled and improved as a part of the program to increase production. The former Aguila refinery at Cuidad Madero will be expanded to handle 47,000 bbl. daily; the former Piece refinery at Arbol Grande will be increased to throughput of 16,600 bbl. daily. The agency said the former Huastect refinery also would be improved but gave no figures for capacity increase.

Despite a rising crude production and increased refinery output, Mexico continues to import a substantial part of its requirements. Some of these are products such as lubricants, paraffin, and asphalt, while other imports are made necessary by lack of transportation to the northern border areas. Besides the lubricants and asphalt, Pemex last year imported 2,219,000 bbl. of motor fuel for the border areas; 3,263 bbl. of naphtha; 67,508 bbl. of kerosine; 295,273 bbl. of gas oil; 1,767,943 bbl. of fuel oil; 19,077 bbl. of greases; 6,322 bbl. of petrolatum; 400 bbl. of petroleum coke; 453,724 bbl. of L.P.G. and more than 170,000 bbl. of refined and unrefined paraffin.

Mexican Tanker Arrives

The first Mexican tanker carrying crude to Argentina has arrived with considerable fanfare in Buenos Aires.

Antonio J. Bermudez, director-general of Petroleos Mexicanos; Manuel Rodriguez Aguilar, chief of the exploration section; and other Pemex officials were on hand for the event. Argentine President Peron sent his private plane to Mexico City to bring the Mexican oil officials to Buenos Aires.

The tanker was Pemex' newly acquired Presidente Aleman which carried approximately 85,000 bbl. Some Mexican oil has previously been shipped to Argentina but this was the first in a Mexican-owned tanker.

A special plaque symbolizing Argentine-Mexican friendship was presented by Peron to be fixed on the dock where the tanker ties up. Burmudez was to formally name the dock. The tanker shipment was widely publicized in the two countries.

Bermudez is scheduled to visit Brazil on his return to Mexico, and there has been talk that the Mexican Government oil agency is seeking to sell crude to that country. The Brazilian ambassador in Mexico City in an interview said there were no serious obstacles to the delivery of large quantities of Mexican oil to Brazil.

Argentina, where the oil industry is largely in the hands of Yacimientos Petroliferous Fiscales, a state agency, meets well over half its petroleum requirements by imports, mostly crude.

EUROPE

Hungary to Ration Gas

The Hungarian public has been astonished by an official government announcement that all motor fuel will be strictly rationed, according to reports coming out of the Communist-controlled country.

While no indication has yet been given of the quantities to be allowed, there was great interest in three clauses of the government order which provide that any automobile owner not considered eligible to receive a fuel ration must immediately offer his vehicle for sale to the public authorities at a price to be fixed by the latter.

The public surprise over the rationing announcement was due to the fact that Hungary has a sizable oil industry of its own with a production estimated in 1949 at about 10,000 bbl. daily. The government had said this was to be increased in 1950, and although Hungary needs only about 6,000 bbl. daily to completely cover its internal needs for motor fuel, under the rationing plan this consumption is to be cut by 10 per cent.

Figures on the Hungarian industry show that it has more than 4,000 bbl. daily surplus for exports, most of which went last year to Russia, Poland, and Czechoslovakia. It appears to some Hungarians that rationing of motor fuel has been introduced in Hungary only to make possible increased exports to Russia.

French Gas' Octane Cut

The current relatively low octane level of motor fuel in France is being cut back because of a shortage of tetraethyl lead in that country.

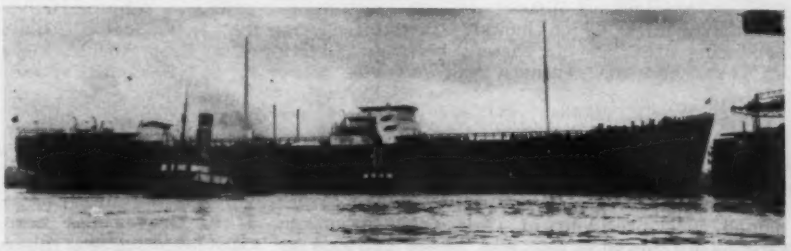
Temporarily at least, sale of premium-grade fuel is being prohibited from March 15. The octane number of the regular grade is being cut from 71 to 69, motor method. The 71-octane motor method formerly allowed provided for a 73 octane, research.

Production of metallic sodium in France was interrupted recently by snowslides in the Alps. France had previously been short of TEL, and this was intensified by the damage to the sodium plant. The new regulation of the French Government prohibits all premium containing TEL. The effect is to discontinue this grade entirely since none of the refiners are equipped to manufacture the higher-octane product without TEL.

In the United States, motorists are now facing a government-ordered cut in gasoline octane to 86 and 90, research, for regular and premium respectively. However, it is pointed out that vehicles on the road in France are built to require a much lower-octane fuel than those in the United States.

(Continued on page 154)

"British Adventure" After Launching



This 28,100-ton vessel, the largest tanker yet constructed in Britain, is now being readied for active service in the fleet of British Tanker Co., Ltd., a subsidiary of Anglo-Iranian Oil Co., Ltd. The tanker, "British Adventure," has an over-all length of 643 ft. and a speed of 15 knots. Launching of the British Adventure was at Barrow-on-Furness Navy Construction Yard. Construction of the British Adventure reflects the activity now taking place in British shipyards. Several United States companies have placed orders for new tankers to be built in Britain. This is due not only to the attractive costs but also to the fact that some of the companies find tanker construction one of the best means for utilizing sterling credits.

XUM

PERSONALS

New Appointment

Russell heads West Texas Gulf Pipe Line

JOSEPH H. RUSSELL, vice president of Gulf Oil Corp. and head of all Gulf's crude-oil purchasing and pipe-line-transportation activities at Houston, has assumed his new duties as president of West Texas Gulf Pipe Line Corp.

A native Texan, Russell graduated from University of Texas in 1914 with a B.S. degree in electrical engineering. That same year he joined Houston Electric Co. and the Beaumont-Port Arthur Interurban & Street Railway Co.

In January 1921 he joined Gulf as an electrical engineer for production operations in the Gulf Coast area, and later that year he became assistant superintendent of production for the entire Houston district of the Gulf companies, which includes the producing areas in the eastern half of Texas and the southern half of Louisiana.

On September 14, 1931, Russell was named assistant to the vice president and in this capacity he supervised production operations in Texas, Louisiana, Arkansas, and Mexico. He was named vice president of Gulf Oil Corp., Gulf Refining Co., and Mexican Gulf Oil Co. in 1944. In this capacity he was the active operating head of the producing and pipe-line operations of these companies in the southwestern states, including Mississippi, Arkansas, Louisiana, Texas, and Mexico.

In 1950 he was made head of all crude-oil purchasing and pipe-line-transportation activities, which were established as separate and primary departments of the company.

In addition to his duties with Gulf, he is president of Tabbs Bay Oil Co., president of Project Five Pipe Line Corp., a director of Halliburton Oil Well Cementing Co., and a director of Devonian Oil Co.

William E. Kreiss has been named night-shift superintendent at Esso Standard Oil Co.'s Bayonne, N. J., refinery. At Esso's Bayway refinery, Linden, N. J., **Walter Farrell** and **Edward Smith** have been named to succeed **Anton Schleck** and **Lawrence Beaghan,** who retired as night superintendents.

D. B. Hodges, vice president in charge of transportation and supplies for Shell Oil Co., has been appointed director of the supply and transportation division of the Petroleum Administration for Defense in Washington, D. C. He served as associate director of the same division during World War II.

R. G. Follis, chairman of the board of Standard Oil Co. of California; **Robert Watt Miller** and **Paul Pigott,** directors; and **T. L. Lenzen,** general manager of Eastern Hemisphere operations, left the United States recently for Saudi Arabia on a trip during which they also will visit operations of company affiliates in the Far East.

M. E. McCullough, partner in Fain & McGaha, is the new president-elect of the North Texas Oil and Gas Association. **E. B. Clark,** of the E. B. Clark Drilling Co., has been named vice president; and **Charles N. Perkins,** Prothro, Tex., has been reelected second vice president.

Ralph E. Smith, of Shell Oil Co.'s Houston refinery, has been named chairman of the Gulf Coast subcommittee on training in refining. Other officers include: **J. W. Boston,** Atlantic Refining Co., Port Arthur, Tex., vice chairman; and **P. C. McFarland,** Pure Oil Co., Nederlands, Tex., secretary.

Allan B. Sloss has been elected an assistant to the president of Gulf Oil Corp. and Gulf Refining Co. at Pittsburgh. **I. R. Graves** has been elected an assistant secretary. Sloss joined Gulf in January 1949 as a member of the president's staff. He formerly directed research for Scudder, Stevens & Clark, Investment Counsel, in New York. Graves joined Gulf in 1919 as a clerk in the Shreveport executive department, and was named district executive secretary in December 1950. He will continue in the Shreveport office.

Wendell N. Damonte has been elected vice president and manager of the marine department of Sinclair Refining Co., succeeding **Harry Campbell,** who is retiring after 28 years. He has been with Sinclair since 1923.

George F. Eustis has been named mechanical superintendent of Esso Standard Oil Co.'s Bayway refinery, Linden, N. J., succeeding **Jules Verner,** who has retired. **Dale I. Watkins** succeeds Eustis as assistant mechanical superintendent. **John B. Hanna** has been named to head the maintenance and construction division at the refinery, and **C. H. Degener** is his new assistant.

Nolan Hirsch, formerly with Stanolind Oil & Gas Co., has joined Deep Rock Oil Corp.'s district office at Midland, Tex., as subsurface geologist. **Don Billings,** formerly with Standard Oil Co. of Texas, has joined Deep Rock as a scout in the Permian basin.

F. E. Rice, vice president of the natural - gasoline and gas department, director, and a member of the executive committee of Phillips Petroleum Co., retired on February 28, after 33 years of service. He joined Phillips in 1918, and shortly afterwards designed a plant at Pershing, Okla., which successfully established the modern oil-absorption process for extracting natural gasoline from natural gas. In 1920 he was named superintendent of the gasoline division and in 1930 was elected vice president of the natural-gasoline and gas department. He became a director and member of the executive committee in 1938, and has also been an officer or director in a number of Phillips subsidiaries. In April 1949 he was presented the Hanlon Award by the Natural Gasoline Association of America, the highest honor in that industry.

F. R. Lovering, district superintendent, Shell Oil Co., has been named division production superintendent of the Northern division at Hobbs, N. M. Other changes include: **B. O. Carlson,** junior mechanical engineer, transferred from Midland, Tex., to New Orleans; **K. W. Foster,** junior mechanical engineer, from Tulsa to Midland; **A. T. Guernsey,** district exploitation engineer at Wasson, Tex., transferred to Hobbs as division reservoir engineer; **C. R. Patterson,** production foreman, transferred from McCamey, Tex., to Eunice, N. M.; **K. G. Rowley,** junior exploitation engineer, from

It's a shame that lube manufacture isn't glamorized too

Both of the illustrations on this page are views of the Cit-Con refinery at Lake Charles, Louisiana. They show some of the Horton tanks and towers we fabricated and erected there.*

This refinery—largest in the U. S. designed exclusively for the production of solvent refined oil and wax products—is owned jointly by Cities Service Company and Continental Oil Company.

For some reason, much of the publicity about petroleum refining deals with the processes currently used for producing aviation and motor fuel. "Cat cracking" is a catchy phrase and may be easier to explain and glamorize than "solvent extraction". As a result, the public—and perhaps even some of the people in your company—may not understand that it takes specialized equipment to produce a highly refined motor oil.

Horton* structures are playing an important part in the operation of up-to-date lube oil plants. For example, the accompanying views show some of the structures we supplied for the Cit-Con Oil Corporation's new refinery at Lake Charles, Louisiana. These Horton tanks and towers are helping Cit-Con produce 6,000 bbls. per day of high-quality solvent refined lubricating oils and more than 1500 bbls. per day of waxes.

Whenever you need steel plate work—whether for a glamorous "cat cracker" or for just plain storage—there is a Horton structure to serve you. You are invited to write our nearest office for information or quotations when you need heavy steel plate structures of any type.

**Trademark Registered in the United States Patent office.*

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17...1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington, D. C.....Cafritz Bldg.

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PERSONALS

Midland to New Orleans; and **B. P. Walsh,** production foreman, from Eunice to the Howard-Glasscock, Texas, field.

Frank Devlin, geologist for Sunray Oil Corp., has been transferred from Tulsa to the Oklahoma City district.

R. C. HARRIS

Richard C. Harris, chief geologist in the foreign producing department for Atlantic Refining Co., has been appointed resident manager of the company's operations in Venezuela with headquarters in Caracas. Harris, who was educated at Wisconsin and Standford universities, joined Atlantic in 1938 as resident geologist for its exploratory program in Cuba. He was transferred to Philadelphia in 1941. As head of the Venezuelan operation he succeeds **J. M. Williams,** who has been made general manager of foreign crude-oil production for the company.

Wallace G. Palmer has joined J. B. Gill Co., Long Beach, Calif., refinery and natural-gasoline plant constructors and engineers, as assistant chief engineer.

Millard K. Neptune, manager of Continental Oil Co.'s foreign department, has been granted leave of absence to serve as assistant director of production in the Petroleum Administration for Defense.

E. R. Baker, assistant manager of Continental Oil Co.'s development and research department, and **S. D. Breitweiser,** manager of bulk sales, both at Ponca City, Okla., have gone to the Harvard School of Business Administration for a short course in advanced management.

Ben H. Martin, senior geologist in the West Texas district office of Pan American Production Co. at Abilene, Tex., has been named district geologist, replacing **James R. Day,** who recently resigned. **William B. Rodan** replaces Martin; and **Raymond E. Fairchild,** geological scout at Shreveport, has been transferred to Abilene as junior geologist.

A. W. McCoy, III, has been appointed assistant exploration manager for Gulf Oil Corp. Other appointments in the division exploration staff in Tulsa include: **F. P. Rushmore,** head of lands and leasing; **H. D. Bedford,** assistant head of lands and leasing; **E. B. Roudebush,** chief scout; **P. A. Rahe,** administrative assistant to the exploration manager; **P. H. Reisher,** chief geologist; **A. L. Latta,** chief exploitation geologist; **Charles Ryniker,** chief research geologist; **C. G. Strachan,** staff geologist, Canada; **W. R. Longmire,** staff geologist, Mid-Continent; **C. B. Anderson,** staff geologist, Eastern; and **W. E. Bernard,** Canadian district adviser on exploration under **R. R. Porterfield,** manager of exploration. Area offices have also been established with the following area managers reporting to the manager of exploration in Tulsa: **D. D. Adams,** Oklahoma City area; **M. K. McClure,** Ardmore, Okla., area; **K. W. Bumgarner,** Wichita area; **O. P. Gilbert,** Evansville, Ind., area; **C. L. Albert,** Saginaw, Mich., area; **O. E. Brown,** Durango, Colo., area; **J. B. Maebius,** Casper, Wyo., area; **C. O. Hudgens,** Billings, Mont., area; and **E. J. Baltrusaitis,** Salt Lake City area. **L. L. Gray,** formerly chief engineer, has been named technical adviser on natural-gas and gasoline problems, and **C. C. Rodd,** formerly staff assistant, executive department, as technical adviser on general problems.

Norman Hardy, formerly president of Richmond Exploration Co., Standard Oil Co. of California's operating subsidiary in Venezuela, has been appointed executive assistant to **Fred Davies,** senior executive officer of Arabian American Oil Co., in Saudi Arabia. Davies is executive vice president of Aramco.

E. Paul Ward, Houston division petroleum engineer for Ohio Oil Co., has been appointed assistant to the manager of production at Findlay, Ohio. Other production department changes include: **R. E. McMillen,** Tulsa division petroleum engineer, named to succeed Ward as Houston division petroleum engineer; **F. V. Kluck,** Tulsa, appointed Tulsa division petroleum engineer; **W. T. Kennedy,** district superintendent, Haynesville, La., named assistant to the general superintendent of production, Findlay; and **C. W. Kelley,** named to succeed **E. J. Giffel,** retired, as Terre Haute, Ind., division land man. Ward joined the firm in 1934 as roustabout, was named district petroleum engineer in 1937, and Houston division petroleum engineer in 1941. McMillen joined the company

A.I.M.E. GROUP.—Oilmen gathered at the head table during the dinner held February 20 in St. Louis by the petroleum division of the American Institute of Mining and Metallurgical Engineers included, standing, left to right: Lincoln Elkins, Sohio Petroleum Co., Oklahoma City; Harold Decker, Houston Oil Co., Houston; C. V. Millikan, Amerada Petroleum Corp., Tulsa; M. L. Haider, Imperial Oil, Ltd., Toronto; Willis Pierce, New Jersey Zinc Co., Palmerton, Pa.; R. W. French, Sohio Petroleum Co., Cleveland; J. E. Sherborne, Union Oil Co., Wilmington, Calif., and W. J. Murray, Texas Railroad Commission, Austin. Seated, left to right: Thomas C. Frick, Atlantic Refining Co., Midland, Tex.; Gail F. Moulton, Chase National Bank, New York; Paul R. Turnbull, La Gloria Corp., Corpus Christi; Paul Andrews, Signal Oil & Gas Co., Los Angeles; and Joe Alford, A.I.M.E. staff, Dallas.

XUM

PERSONALS

in 1941 as an engineer, and was appointed Tulsa division engineer in 1949. Kluck joined Ohio in 1944 as district engineer at McPherson, Kans. Kennedy joined the firm in 1930 and was named district superintendent in 1950. Kelley joined Ohio in 1922.

C. A. Swigart, vice president of Trans-Arabian Pipe Line Co., has been named president succeeding **B. E. Hull,** who has retired as president and is returning to The Texas Co. where he will serve in an advisory capacity on pipe-line matters. Swigart, who has been a vice president since 1949, will also serve as a member of the board of Trans-Arabian. His earlier experience included service in the pipe-line organization of Standard Oil Co. of California. His headquarters will be in Beruit, Lebanon. Hull was president of The Texas Co.'s affiliates in July 1946 when he became president of Tapline. He was elected a vice president of Texaco in March 1947.

C. A. SWIGART

B. E. HULL

Erle G. Christian, secretary of Cities Service Co., has been elected a member of the board of directors of the company. He also has served as director of Cities Service Refining Corp., secretary of Empire Gas & Fuel Co., as assistant treasurer of Arkansas Natural Gas Corp., and assistant secretary of Cities Service Oil Co. (Del.).

O. P. Gilbert is the new area manager for Gulf Oil Corp. at Evansville, Ind. **Berry Beam** will be the geologist for Illinois, and **W. I. Ingham,** the geologist for Indiana and Kentucky.

C. J. Tighe, Stanolind Oil & Gas Co., has been named division gas superintendent for the Rocky Mountains, succeeding **G. F. Moore,** who has been made operating superintendent of plants for Stanolind at Tulsa. **Donald Falkingham** has been named field engineer at Rangely, Colo., succeeding **Glenn H. Lancaster,** who was recently transferred to the firm's Ellinwood, Kans., office. **Walter C. Pearson,** Kansas district engineer at Ellinwood, has been transferred to Oklahoma City as assistant division engineer for the central division.

John T. Williams, pipe liner at Wewoka, Okla., for Interstate Pipe Line Co., is in Saudi Arabia on loan to Trans-Arabian Pipe Line Co.

Eugene R. Manning, junior petroleum engineer for Stanolind Oil & Gas Co., has been transferred from Odessa to North Cowden, Tex.

G. H. Zwiebel, Jr., party chief for National Geophysical Co., has been transferred from Hamlin to McCamey, Tex., in the same capacity.

A. M. Derrick, Jr., engineer in the producing department at Wink, Tex., for Stanolind Oil & Gas Co., has been transferred to Midland, Tex., as reservoir engineer.

Harvin L. Landua, formerly supervising petroleum engineer for Humble Oil & Refining Co., at Houston, has joined **Ralph Lowe,** independent oil operator and drilling contractor, at Midland, Tex., as chief petroleum engineer.

Dan H. Carpenter, formerly with Tretolite Co. at Kingsville, Tex., has joined Sohio Petroleum Co. at Oklahoma City as a treating engineer.

Norman D. Bradley, East Ohio Gas Co., Cleveland, has been elected chairman of the Great Lakes Personnel Conference of the American Gas Association. Other officers include: **John J. Solon,** Peoples Gas Light & Coke Co., vice chairman, and **Earl G. Huck,** Cincinnati Gas & Electric Co., secretary.

R. L. Fletcher, president of Providence Gas Co., has been named to head the 1951 A.G.A. Distinguished Service Award Committee. Also serving on the committee are **F. M. Banks,** president of Southern California Gas Co., Los Angeles, and **S. B. Irelan,** president of Cities Service Gas Co., Oklahoma City.

Harold Nissen, engineer with Signal Oil & Gas Co., Los Angeles, has been elected chairman of the junior section of the American Institute of Mining and Metallurgical Engineers, Pacific Coast chapter. **D. B. O'Neill,** Shell Oil Co., was elected secretary; and **R. L. Parsons,** of California Research Corp., treasurer.

W. J. Epler, formerly branch manager of Murphy Diesel Co., has joined Wagner-Wyant Drilling Co. of Amarillo, Tex.

E. C. Taber, Jr., geologist division for Shell Oil Co. at Oklahoma City, is en route to The Hague, Holland, for a 6-month assignment. Taber joined Shell in 1939 after graduating from Stanford University. In 1947 he was transferred to the Oklahoma City office as coordinator for subsurface geological work in the Oklahoma division.

Alvino V. Reyes, geophysical computer for Atlantic Refining Co. at Stillwater, Okla., has been transferred to Tulsa in the same capacity.

R. E. McCulloch, formerly with Forrest Oil Corp., has joined Davidson & Co., a newly formed tri-state operating firm at Casey, Ill., as general superintendent.

Gail H. Stoddard has been named executive head of the West Texas geological department for Hiawatha Oil & Gas Co. at Midland, Tex. He was formerly superintendent of exploration for the Midland division of Standard Oil Co. of Texas. **William N. Mosher,** also formerly with Standard of Texas, at Dallas, has joined the firm's geological staff in Midland.

DEATHS

Charles Russell Burke, 79, Tulsa gasoline engineer, died at his home March 4. He had been associated with Danciger oil interests before his retirement.

Claude H. Terwilleger, 72, widely known Tulsa realtor, independent oil operator, died at his home last week.

Fred E. Lesser, 51, owner of Lesser Oil Co., Houston, died February 25.

Edgar Clinton Johnston, Sr., 52, nationally known East Texas pioneer oil man, died February 27 at Longview, Tex. He was head of Johnston Enterprises, oil-field-equipment manufacturing.

Aimes H. Rollefson, 49, physicist with Hoard Exploration Co., died February 18 at Houston.

W. A. Dickson, 45, president of Dickson Drilling Co., Houston, died in an airplane crash February 28. The same crash claimed the lives of **J. L. Roy Newlin,** 42, president of J. L. Roy Newlin, Inc., an oil-field hauling company, and **Thomas A. Price,** 40, superintendent of Mexican division of Halliburton Oil Well Cementing Co., Houston.

Col. Edwin V. Foran, 54, died of a heart attack February 22 in San Antonio. He had been a member of Army and Navy Petroleum Board during World War II.

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When you see a new International Truck at work in the oil fields you know a truck buyer has given careful consideration to these three important points:

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Every model heavy-duty engineered to save you money

XUM

Stubbing Drill Collars by Thermit Welding

The oil industry borrows an idea from the railroad and heavy-machinery industries, and applies it to prolonging the useful life of drill collars. Here's how it is done.

by Roy F. Carlson
West Texas District Editor

IN areas where long strings of drill collars are used, excessive stresses cause frequent breakage or extreme wear on pins and boxes. In either case, the collar must be sent to a machine shop to have pin and box threads recut. Several of these trips to a shop will shorten the collar to where it is very difficult to use in drilling. As a result, rather than discard the collar, machine shops have devised various methods of adding to the length of the collar—a process known as "stubbing." One of these processes involves adding a short section of new collar onto either or both ends of the old one by means of thermit welding. Accompanying photographs show several of the steps involved in this procedure.

The thermit reaction has been used for several years in welding railroad rails and in repairing such heavy machinery as stern frames on ships, or frames for heavy rolling machines in the steel industry. The mold for the weld can be made in a wide variety of sizes and apparently has many oil-field applications. Up to now its use at Empire Machinery Co., Odessa, Tex., where the accompanying photographs were taken, has been limited to repair of drill collars and kellies. Many other kinds of heavy-duty repair jobs could be done, however. The welding has been used to join pieces of drill collars or kellies, either for lengthening them or replacement of a bad section.

This stubbing process consists of first building up the bore of the old drill collar to a diameter a little less than that of the piece to be added. This is necessary because the old collar bore has usually been enlarged by erosion of high-velocity streams. The bore is built up for a short distance by application of welding rod, and is then machined to the same diameter as the new piece.

The matching ends of the two pieces are cut off square with an acetylene torch, and the surfaces that are to be contacted by the welding material are thoroughly cleaned by brushing. The pieces are spaced about 1 in. from each other, and are held in line by jacks and by a short piece of bar stock that fits the bore of the two pieces very closely. The bar stock is about 8 in. long and where it crosses the aperture between the two drill-collar pieces is notched to provide room for flow of the welding material. This bar also acts as a dam so that the welding material will not follow the drill-collar bore and flow away from the weld.

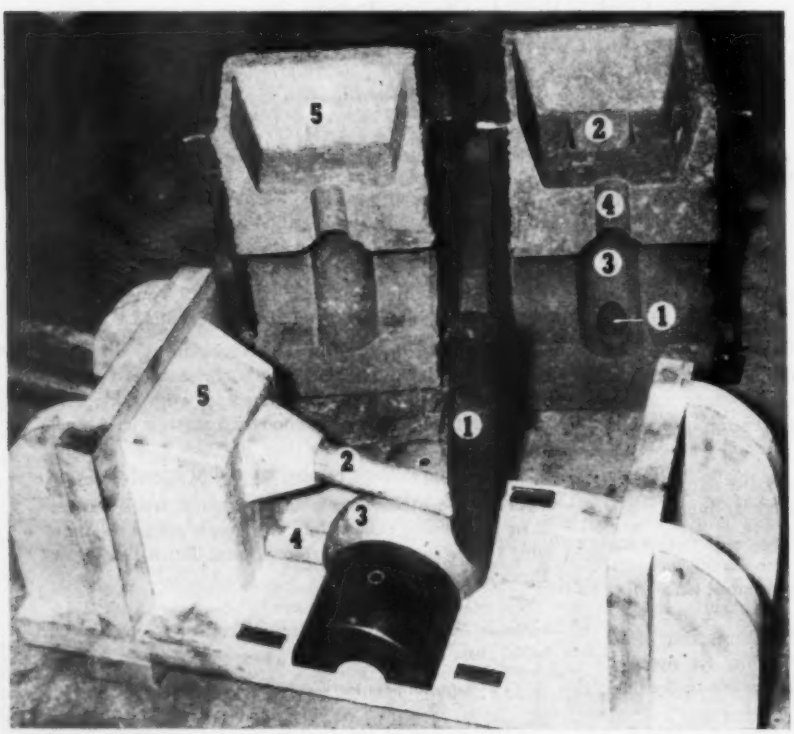

Fig. 1—THE MOLD.—A completed mold consists of two sections. Each section is prepared from a wooden mockup or pattern. The section of the mold on the right was prepared with the removable rods in the position in which they are shown in the mockup. Numbers on the mold correspond to those on the mockup and are: (1) the heating gate, (2) the pouring gate, (3) the outline of the form to be taken by the weld metal, (4) slag riser, and (5) a slag and excess metal well. The section of the mold on the left was prepared with parts 1 and 2 removed from the pattern.

Mold Is Fitted

After the two parts of the collar are lined up and fixed in that position, a mold is fitted around the adjoining ends that are to be welded. This mold fits closely to the outside of the collar and on the inside corresponds to the desired contour of the weld to be made. The mold is made of specially prepared molding sand that is tamped into metal forms around a wooden mockup or pattern of the parts to be welded. Each of these metal forms contains about half of the complete mold.

The sand is solidly tamped, and as in any foundry molding, can be handled without deformation of the mold shape. Openings in the mold for venting, feeding and other purposes are made by tamping the sand around removable wooden rods, most of these being located in one-half of the mold. These holes are shown in Fig. 1 which shows the finished parts of the mold. The wooden form or pattern is also shown with all the rods in place for one-half of the mold. Holes are provided for pouring the weld, for heating the weld before welding, and for escape of slag products formed during the thermit reaction.

The two halves of the mold are bolted together around the place where the weld is to be made. When the mold is in position, the inside of

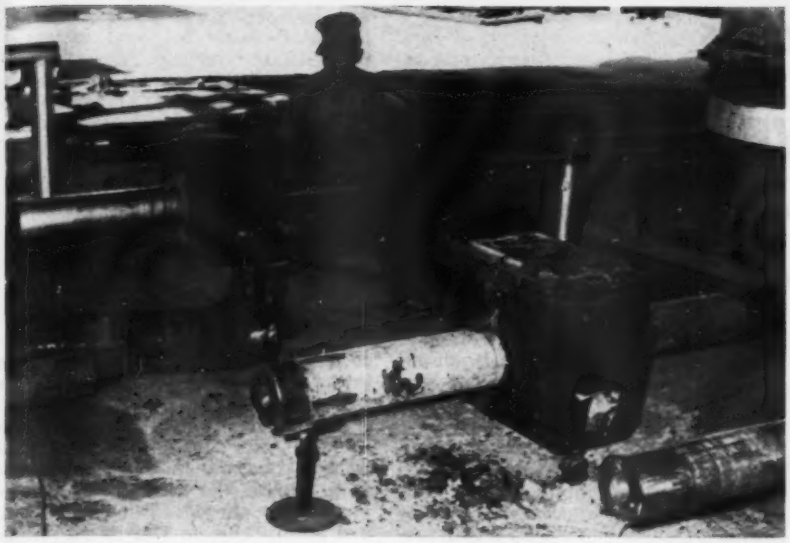

Fig. 2—ASSEMBLED MOLD.—The mold in the background is being heated through the heating gate, the one in the foreground has been poured. The pieces of the collar are held rigidly in line by a short section of bar stock that fits the bore of the collar closely. The collar in the foreground has been cut off square and brushed clean, preparatory to being welded.

Fig. 3—POURING METAL.—Mold and collar have been heated to red heat through the heating gate shown plugged at lower right of the mold. When the collar is heated to the desired temperature, the gate is quickly plugged with molding sand, the reaction started in the crucible and the weld metal poured.

the mold and the drill collar are heated through a heating gate that is left in the mold when it is formed from the sand. This heating dries the inside of the mold, and preheats the metal in the drill collar before the weld metal is poured, reducing local stresses that might form if extremely hot weld metal was poured around a cold drill collar. As the molding sand is dried inside the mold it is also baked and becomes very hard—to almost the consistency of sandstone.

Immediately after preheating, the weld is poured. In this process, a large magnesite-lined crucible is filled with the correct amount of welding compound, consisting of finely divided pure aluminum, powdered iron oxide (Fe_3O_4), pellets of metallic steel, and other additives, varied so that the composition of the weld metal matches the composition of the drill collar. The reaction is initiated by igniting a special powder, and once started spreads rapidly throughout the welding mixture, generating intense heat, and producing molten metal at about 5,000° F. The reaction, which takes about 30 seconds regardless of the amount of welding compound, is as follows:

$$8\,Al + 3Fe_3O_4 \rightarrow 4\,Al_2O_3 + 9\,Fe$$

When the reaction is completed, the crucible is tapped or opened through a small steel plate in its bottom, and the molten mixture of steel and aluminum-oxide slag flows into the mold and around the ends of the drill-collar pieces. Since the slag of aluminum oxide that is formed is lighter than the steel that is formed, and since both slag and steel are highly liquid, the slag collects in a well at the top of the mold. The molten steel completely fills the void

(Continued on page 84)

Fig. 4—COMPLETED WELD.—The mold has now been stripped off and slag has also been removed from the weld. The heating gate is represented by the metal extending horizontally to the right at the bottom of the weld, the pouring gate is connected to it, and the slag and excess metal riser are in the center of the weld.

Fig. 5—LAST STEP.—All risers and gates are cut off. Next the collar will be heat treated and then the welded section will be rebored, followed by finish machining it on the outside of the weld.

Special Compound Proves

Effective Water Conditioner

by Frederick Latter* and Carleton Parke†

Cost of water treatment with new compound was reduced from $4.52 to $4.16 per day, exclusive of savings in labor and storage space

THE use of a single organic chemical or mixture of chemicals to replace the customary water treatment for control of both corrosion and bacterial growth in the secondary recovery of oil by water flooding has been reported in the literature.[1 to 7] In a previous paper[1] the use of a mixture of a quaternary ammonium salt, a condensed ethylene oxide-fatty acid wetting agent and sodium nitrite as a corrosion inhibitor in the Bradford, Pa., field was reported.‡ The present paper presents the results of the first Mid-Continent test of this product.

In the Bradford area it was found that this mixture removed all traces of oxygen from input waters, thus preventing oxygen corrosion. It also forms a protective film on metal surfaces thereby inhibiting other types of flood water corrosion as well. This mixture was also shown to be an effective bactericide preventing the growth of bacteria, algae, and other microorganisms.

Arrangements were made with Stekoll Petroleum Co. to conduct a field test in the Mid-Continent area to determine the adaptability of this product to the Mid-Continent field; and specifically, to test its corrosion-inhibiting qualities in flood waters containing produced brines. The results were encouraging; the corrosion costs were cut in half and the bacteria test indicated a 95 per cent kill in 24 hours after treatment with 10 p.p.m.

*President and †engineer, Pur-O-San Co., Bradford, Pa.

‡Trade name "Pur-O-San."

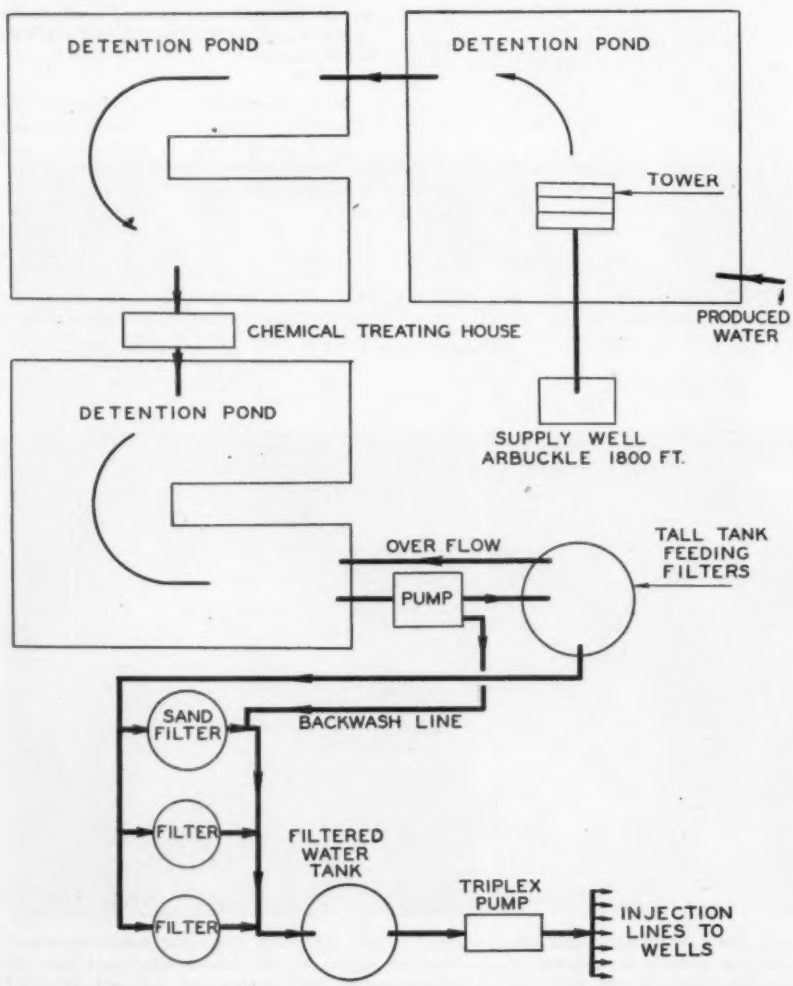

Fig. 1—Flow scheme of the water conditioner installed on the property of Stekoll Petroleum Co. near Independence, Kans.

Location of Water-Flood Test

The Stekoll Petroleum Co. property, Flood No. 4, near Independence, Kans., was selected for this test. It had 71 injection wells and 65 producers between 1,100 and 1,200 ft. deep taking about 4,300 bbl. of water a day. Produced water not aerated is combined with a source water from the Arbuckle lime formation at 1,800 ft. in the first of three detention ponds, as shown in Fig. 1. The treated water is gravity fed through three sand filters, to a clear tank, and then to the system by two triplex pumps.

The chemical was first fed into the detention pond by a small proportioning pump fed from a 55-gal. drum. Later it was found to be simpler and equally satisfactory to feed the chemical from an open drum (with a nipple and gate valve welded near the bottom) directly into the injection water. This drum should be painted on the inside to prevent the concentrated chemical from attacking the metal.

Previous water treatment.—The water on this lease was previously treated with lime and alum with the addition of formaldehyde to prevent corrosion. The lime and alum were added to the water in a channel between the second and third detention pond by means of rotating barrel feeder and a rotating paddle agitator. The formaldehyde was dripped into the clear tank.

Discussion of Inhibitors

Use of amine-type corrosion inhibitors such as Rosin Amine D Acetate, Arquad S, Pur-O-San, etc., have been reported by various laboratories in Bradford field,[1 to 7] the results com-

paring favorably with the more conventional types of water treatment. The mixture used in test described here goes by the trade name of Pur-O-San.

The inhibiting action of this mixture is due in part to the complete removal of dissolved oxygen from the input water. Dissolved oxygen present in flood water will attack iron, forming iron oxide, and causing rapid pitting of iron pipe and equipment. Iron-oxide rust formed is carried into the well where it enters the pores of the sand causing what is known as sand-face plugging. In addition to the removal of oxygen, the compounds present in the product form a film coating the inside of the pipe and other equipment thereby preventing or inhibiting corrosion by other agents such as hydrogen sulfide, acidic water, etc. This dual role was described in the previous paper.[1]

The sand-face plugging mentioned above can be caused not only by the products of all types of corrosion but also by bacteria and other microorganisms and by other chemical precipitants. It is one of the major problems confronting the producer in water flooding. This plugging action causes a gradual and occasionally a rapid decline in water-injection rates, which in turn causes lower oil recovery. In leases which have been subjected to water flooding for some time the problem is twofold. Preventing further plugging by present water treatment and the removal of the plugging agents formed by past water injection.

The lease used for these tests had been flooded for some time with a highly corrosive water. The water was kept supersaturated with $CaCO_3$ in the hope that a calcium deposit on the pipe might help in limiting corrosion. It was felt that the sand face in these wells was very probably similarly coated with a calcium deposit together with a possible growth of bacteria not completely destroyed by the formaldehyde treatment. Accordingly, a 27-p.p.m. concentration of Pur-O-San was used in the initial treatment. This should have completely destroyed any bacteria growths on the sand face. A backflow program was started on the fourth day to remove the material loosened from the sand face. In cases where the backflow rate is slow and wells are highly polluted with foreign matter, they should be jetted out to remove the organic material from the sand face. This was not possible in all of the wells on this lease.

The formaldehyde treatment was discontinued upon the addition of Pur-O-San. The lime-alum treatment was gradually diminished and stopped entirely 1 month after treatment began. After the initial treatment with 27 p.p.m., the concentration was dropped to 8 p.p.m. at the end of the first week. This was considered adequate for continuous treatment.

About 4 days after the lime-alum treatment was discontinued it was discovered that the water in the clear tank had become slightly turbid. At the same time it was observed that coated sand particles were being discharged in the backwash of the middle filter. The filters were isolated one at a time, and it was found that with the center filter turned off, the water cleared up noticeably in several hours. This filter was inspected and it was found that each sand particle had a hard coating formed on it. Acid was poured on a sample of the filter sand and the coating apparently was a calcium formation.

The previous water had carried supersaturation of $CaCO_3$ of from 8 to 10 p.p.m. The sand coating had been previously encountered by other operators in this area. A sample of the sand from this filter was washed with Pur-O-San and allowed to soak for several days. It appeared that a cleaning action was taking place. The filter was also found to be 18 to 20 in. fuller than normal and there were many large and tightly packed areas throughout the sand. This action was apparently responsible for the presence of the coated sand particles in the backwash from this filter.

All three filters were inspected and recharged and no further trouble was encountered during the 6-month period covered by this report. In comparison, a filter in use for 7 months on another Stekoll flood nearby—which had been filtering lime and alum treated water—was found to be in such poor condition that it had to be recharged. A centrifugal pump handling the same water had to be dissembled and cleaned out.

When the water in the clear tank became turbid the concentration of Pur-O-San was increased from 8 to 11 p.p.m. to determine whether a stronger concentration of chemicals was needed. After the filters were recharged, the treatment was again reduced to 8 p.p.m. and considered to be ample.

Four days after the test was started.

TABLE 1—RESULTS OF WATER ANALYSES, STEKOLL PETROLEUM CO. FLOOD NO. 4

	Sample number						
	1171	1173	1172	1174	1170	1176	1175
	Water supply well, not filtered		Water return, not filtered		From output side of filter treated with lime and alum	Mixture, 50 per cent 1173 50 per cent 1174	
	Before treatment	Treated with 8 p.p.m. Pur-O-San	Before treatment	Treated with 8 p.p.m. Pur-O-San		Not filtered	Filtered
Appearance when sampled	Murky	Murky	Murky	Murky	Clear	Dark	Hazy
Appearance after standing	Murky	Murky	Murky	Murky	Clear	Dark	Hazy
Odor	H_2S	H_2S	H_2S	H_2S	None	H_2S	H_2S
Taste	Sulfur	Sulfur	Brine	Brine	Brine	Brine	Brine
Temperature, °F.	78	78	78	78	78	78	78
pH	6.8	6.8	6.8	7.0	7.3	7.0	7.4
Carbon dioxide	92	103	34	31	20	58	32
Dissolved oxygen	0	0	0	0	0.6	0	0
Residual chlorine	0	0	0	0	0.1	0	0
Color, pt.	70	70+	20	35	15	70+	70
Turbidity	37	39	24	45	0	110	Clear
Hydrogen sulfide	146	133	8.5	3.4	0	117	24
Specific gravity, 60/60	1.06910	1.0682	1.0618	1.0616	1.0648	1.0651	1.0642
Total alkalinity as $CaCO_3$	252	230	240	230	120	230	215
Supersaturation as $CaCO_3$	27	7	59	34	7	50	51
Calcium	4,980	5,030	4,200	4,260	4,580	4,660	4,520
Magnesium	1,199	1,182	1,101	1,057	1,074	1,076	1,101
Sodium	31,786	29,762	27,922	29,785	30,061	29,276	28,728
Sulfate	412	457	106	118	341	260	292
Chloride	60,992	57,801	53,545	56,385	57,446	56,385	55,912
Silica	50	40	32	20	34	78	62
Oxides, iron and aluminum	112	94	134	98	134	130	110
Total iron	40	48	44	41	46	34	63
Aluminum	28	13	37	20	35	15	9
Total dissolved solids	99,783	94,596	87,324	91,953	93,825	92,137	90,949

All results reported as parts per million unless otherwise marked.

the plant pressure was increased from 875 to 900 psi. by order of Stekoll's home office in Dallas for reasons having nothing to do with this test. This makes it difficult to evaluate the data compiled on intake rates. The total water injected remained at approximately 4,370 bbl. per day both before and after the treatment with Pur-O-San. This increase in injection rate in the test wells that were cleaned out, a normal decline in injection rate, the fact that many small leaks were repaired and many possible new leaks were prevented, and the pressure rise seem to have balanced each other so that no over-all increase in injection rate was apparent. Eight months after the start of the treatment, there was no measurable decline in injection rate. Approximately 4,370 bbl. of water was still being injected at a pressure of 900 psi.

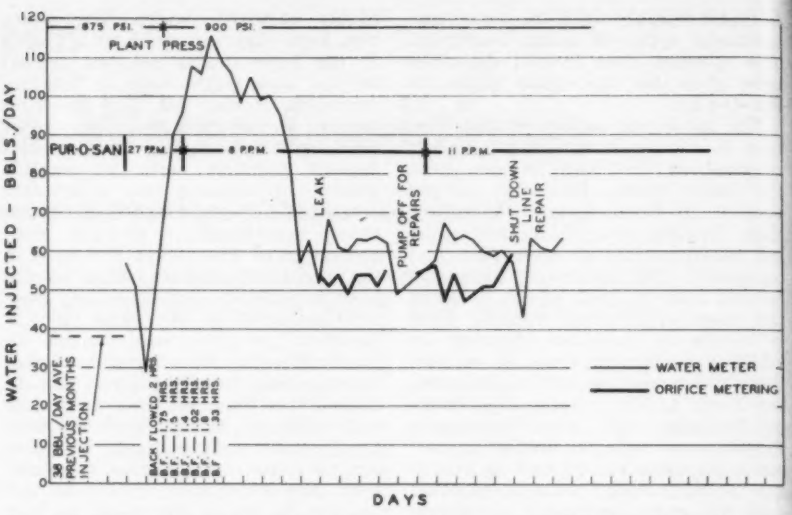

Fig. 2—Orifice-meter measurements on input to injection well 168-867, Stekoll Petroleum Co. operations near Independence, Kans.

Results

Water analyses and bacteria tests were made on the water and are included here as Tables 1, 2, and 3. Table 1 shows analyses of both source water and returned water before and after treatment with Pur-O-San, before filtering, at the beginning of this test period. Column 5 of Table 1 gives the analyses of the lime-alum treated water after filtering. Columns 6 and 7 give the analysis of a mixture of 50 per cent source and 50 per cent returned water (approximating the mixture in actual use) after treatment with Pur-O-San before and after filtering.

TABLE 2—RESULTS OF WATER ANALYSES, STEKOLL FLOOD NO. 4, MONTGOMERY COUNTY, KANSAS

Source of sample: From clear tank of Stekoll Flood No. 4, Nov. 23, 1949

Specific gravity at 60°/60° F.	1.0677
pH	7.0
Total alkalinity as $CaCO_3$	136
Undersaturation as $CaCO_3$	8
Calcium	4,280
Magnesium	1,218
Sodium	30,360
Sulfate	463
Chloride	57,516
Silica	86
Oxides or iron and Aluminum	162
Total iron	85
Turbidity as SiO_2	37
Dissolved oxygen	0.39
Carbon dioxide	70
Residual chlorine	0.0
Total dissolved solids	94,221
Aluminum	20
Appearance when sampled	Clear
Appearance after standing	Hazy
Odor	Disagreeable
Temperature, °F.	71
Taste	Brine
Hydrogen sulfide	0.0

Lime and alum treatment shut off 4 days before sample was taken.

Table 2 gives a similar analysis of the filtered water 4 days after the lime-alum treatment was stopped. This shows an undersaturation of $CaCO_3$ of 8 p.p.m. and no hydrogen sulfide. The lower pH and slight undersaturation of $CaCO_3$ is desirable since Pur-O-San is itself a corrosion inhibitor and, therefore, there is no need to coat the lines with a calcium deposit to prevent corrosion.

The bacteria test in Table 3 shows a 95 per cent kill on this water in 24 hours after treatment with 10 p.p.m. Once the system has been cleaned up and most of the organic matter removed, the bacteria have less to feed on and therefore should be killed even at lower treatments. In some cases where the backflow rate is slow and wells are highly polluted with foreign matter, they should be jetted out to remove the organic material from the sand face.

Cost of Treatment

The cost of treatment, computed only on the power required and chemical used, was 26 cents per day less using Pur-O-San ($4.52 with lime and alum as against $4.16 with Pur-O-San). This does not take into consideration ease of handling and saving in labor time or the smaller storage space required. Similar cost reductions have been found with this and other amine-type chemicals compared with the standard water-treatment costs.

The cost of repairing and replacing pipe and equipment as a result of corrosion was estimated by the lease superintendent to cut approximately in half by the use of this amine-type corrosion inhibitor. The highly corrosive water used on the property under high pressure had caused considerable expense.

Six wells were selected for daily observations during the early part of the treatment. Water meters were installed on three wells, and these readings along with the injection rates for each well, determined by the orifice metering systems already installed were recorded. The fourth day a backflow program was started so that over a period of 7 days, each well was allowed to backflow from 1 to 2 hours a day. The results of these tests are shown in Fig. 2.

Fig. 2 (Well 168-867) indicates an approximate 37 per cent increase in injection rate based on orifice-meter readings before and after the treatment was started.

Data for Well 173-863 indicated no help at all. The high-pressure side of the orifice on this well was metered improperly. The water-meter readings compare favorably with orifice-meter readings taken by a Stekoll employe, so it is therefore concluded that there was no increase in injection rate.

Well 168-858 indicated an approximate 21 per cent increase in injection rate. Well 159-854 indicated an approximate 92 per cent increase.

Well 155-872 indicated an approximate 48 per cent increase. This well developed a hole in the tubing and took 421 bbl. of water the third day of the test. It was later plugged but the readings may be inaccurate since there was no assurance that the hole was completely plugged.

Well 173-867 indicated an increased injection rate but these readings were not confirmed by separate data taken by the superintendent as were all

TABLE 3—BACTERIA TEST*

Time—	Untreated Bact. per cc.	2 p.p.m. Bact. per cc.	2 p.p.m. % kill	4 p.p.m. Bact. per cc.	4 p.p.m. % kill	6 p.p.m. Bact. per cc.	6 p.p.m. % kill	8 p.p.m. Bact. per cc.	8 p.p.m. % kill	10 p.p.m. Bact. per cc.	10 p.p.m. % kill
24 hours	247	71	71	62	75	52	79	34	86	13	95
48 hours	533	143	73	106	80	97	82	63	89	21	96

*Water sample—November 23, 1950—cycle water and Arbuckle lime water before treatment.

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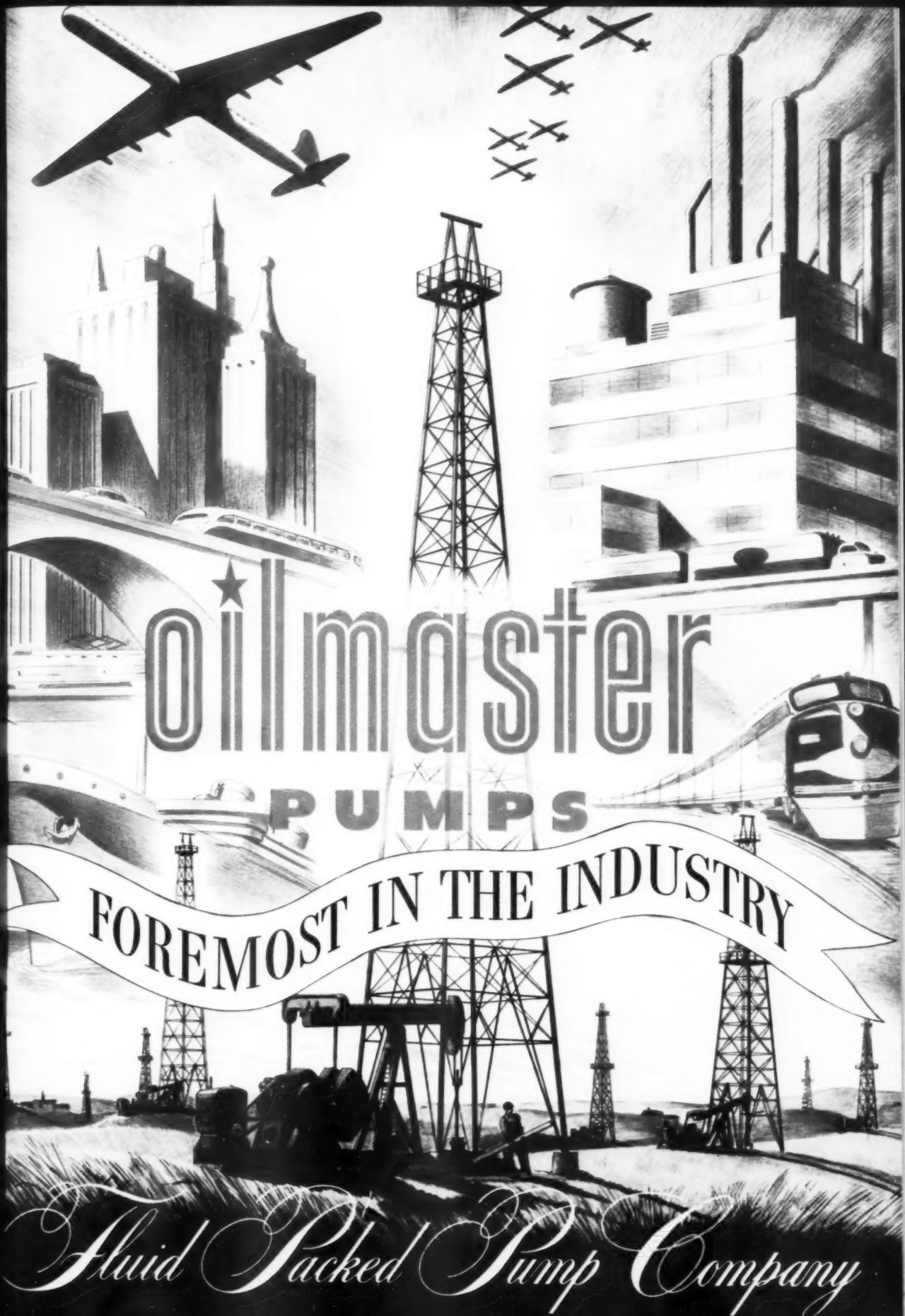
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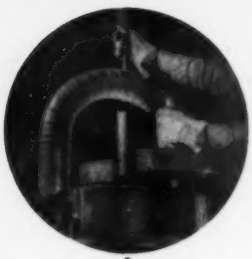

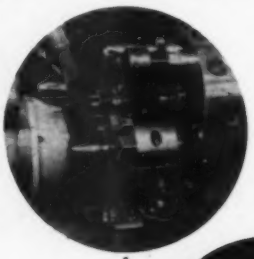

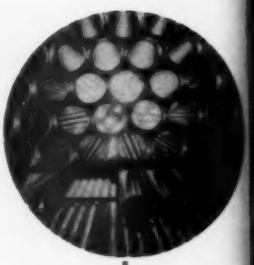

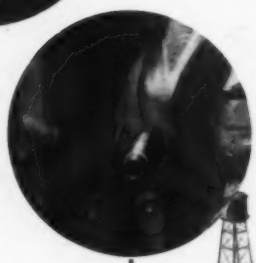

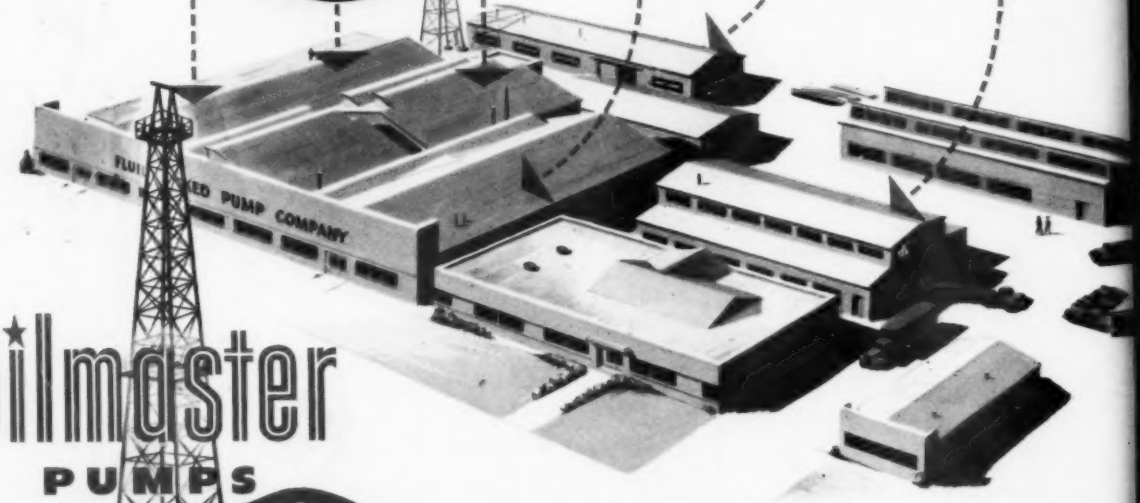

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TABLE 4

Well No.—	Perm. (ft.)	Rate*	Bbl./ ft.	Rate†	% inc.
155-872	6.5	25	4	37	48
159-854	...	25	..	48	92
168-858	23.0	47	2	57	21
168-867	16.7	38	2	52	37
173-863	16.0	38	2	38	0
173-867	10.0	15	..	15	0
Average (per cent)					33

*Sept. 24 to Oct. 24, 1949. †Nov. 15 to Dec. 15, 1949.

of the other results reported in this paper. A later check on this well indicates that if there was any increase in injection it was only temporary.

The results from all of these wells are tabulated in Table 4. They showed an average increase injection rate of approximately 33 per cent. This is typical of past increases after the use of this product.

Conclusions

The use of a compound containing an amine-type corrosion inhibitor reduced the cost of corrosion repair, including both equipment and labor time, about 50 per cent.

Bacteria tests indicated a 95 per cent kill on this water in 24 hours after treatment with 10 p.p.m.

Injection rate tests on six wells tested showed an average increase of approximately 33 per cent.

The over-all injection rate, however, did not increase. An increase in this rate might have been obtained if it had been possible to backflow all of the injection wells more often, as was done on the six wells tested.

The cost of the water treatment was reduced from $4.52 to $4.16 per day not including the saving in labor time or the smaller storage space required.

Acknowledgment

Thanks are due to Marion Stekoll of Stekoll Petroleum Co., Dallas, for permission to publish some of the data included in this paper, and to J. V. Threadgill, superintendent, and W. L. Hodges, engineer, Kansas district, Stekoll Petroleum Co., Independence, Kans., for their part in helping to obtain and check the field data.

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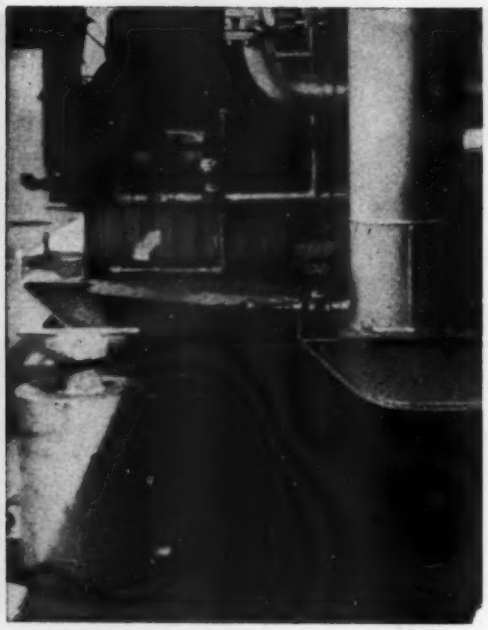

Fig. 1—(Left) Assembly of aspirator for introducing acid into cooling-tower water for pH control. Fig. 2—(Right) Injector for chromate treatment. At lower left is shown pressure vessel for dissolving chemicals. Air line ties into vessel near top to force treating solution into bottom of engine-jacket standpipe.

WATER TREATMENT

in natural-gasoline plants

by B. J. Willard* and T. L. McCaleb*

Periodic sampling and analysis of all plant waters are necessary to assure that conditions are satisfactory and that treatments are yielding desired results. Here is how The Texas Co. safeguards the quality of this commodity.

WATER is used in natural-gasoline plants for heating, power, and cooling. The heating and power-producing equipment involves boilers, evaporators, softeners, preheaters, and steam lines. The cooling equipment consists primarily of cooling towers and engine jackets.

Proper water treatment in heat-exchange equipment realizes a maximum in heat transfer by minimizing the deposition of insulating materials from the water. The useful life of the equipment is prolonged when corrosion is mitigated, and harmful effects of mechanical and chemical removal of deposits are avoided. Maximum utilization of water is effected through proper treatment, thus appreciably lowering its consumption. This is particularly valuable where water is scarce or expensive.

Plant waters should be analyzed at least once a month. Samples should be taken of each separate operation, and of the supply source to the plant. These results should be checked for changes in composition to determine if conditions exist which require changes in treatment. Changes are expected, and therein lie the problems of chemical control. If initial decisions on the type of treatment to be used are sound, then the control problem is simplified.

*Producing department, Pacific Coast Division, The Texas Co. Presented at California Natural Gasoline Association meeting, Los Angeles.

Cooling-Tower Water

One of the most serious problems confronting the plant chemist is the formation of scale on heat-transfer surfaces which are cooled by cooling-tower waters. The first consideration is to ascertain the reasons for the formation of scale. These causes may be enumerated as:

1. Untreated, or improperly treated water.
2. Excessive heat load in system.
3. Poor distribution of water over condenser coils.

An excessive heat load in the system or poor dispersion of water over the coils will create conditions that cannot be remedied by chemical treatment alone. If additional cooling requirements are incorporated without increasing the cooling capacity of the system it is advisable that the plant engineer be consulted to make certain that the cooling capacity has not been exceeded. The presence of extremely hot coils in a cooling system generally causes the cooling water to flash and scale is formed even with properly treated water. A precooling process is usually a satisfactory remedy.

One of the most effective and economical methods of tower water treatment is pH control. Sulfuric acid is more generally used for pH control because it is relatively inexpensive as compared with other acids. The use of a sulfur burner to lower the pH of cooling water by dissolving sulfur dioxide gas in water has been used successfully. Where natural waters have a pH of above seven, the primary concern is a lowering of pH and a reduction of alkalinity. To inhibit effectively the formation of scale by this method of treatment a surface-active material, usually a mixture of one of the phosphates and an organic colloid, is used.

Scale control with acid.—The presence of calcium and magnesium bicarbonates in most natural waters is considered to be the main offender in the formation of scale. These bicarbonate salts break down with heat to form insoluble carbonate scale. By the addition of sulfuric acid to the water, they are converted to the more soluble sufate salt. By taking advantage of the much greater solubility of calcium sulfate, an increase in the number of allowable concentrations may be effected safely, resulting in a substantial decrease in water consumption.

The addition of a surface-active agent will allow increased concentrations of the cooling water without scaling by the sequestering of scale-forming constituents. This material will also allow some upward variance of the pH without harmful results, and will to some extent protect exposed metal surfaces from corrosion. The amount of surface-active material generally required is relatively small as compared to the amount of scale-forming elements present.

The introduction of sulfuric acid into the cooling water presents a number of small but perplexing problems. Depending upon the acid requirements for the cooling water, the acid may be purchased in drums, carboys, or in tank-car quantities. In

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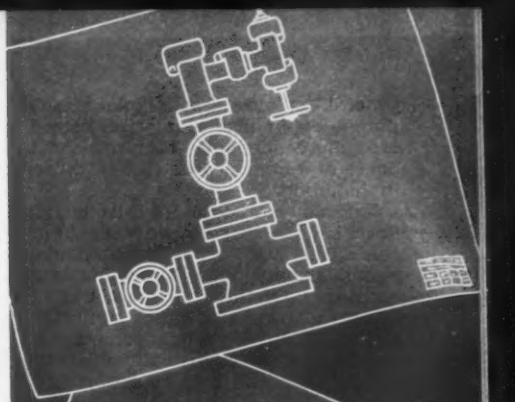

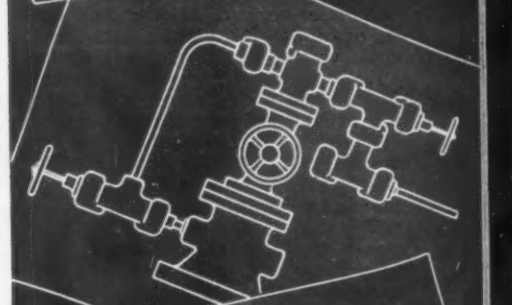

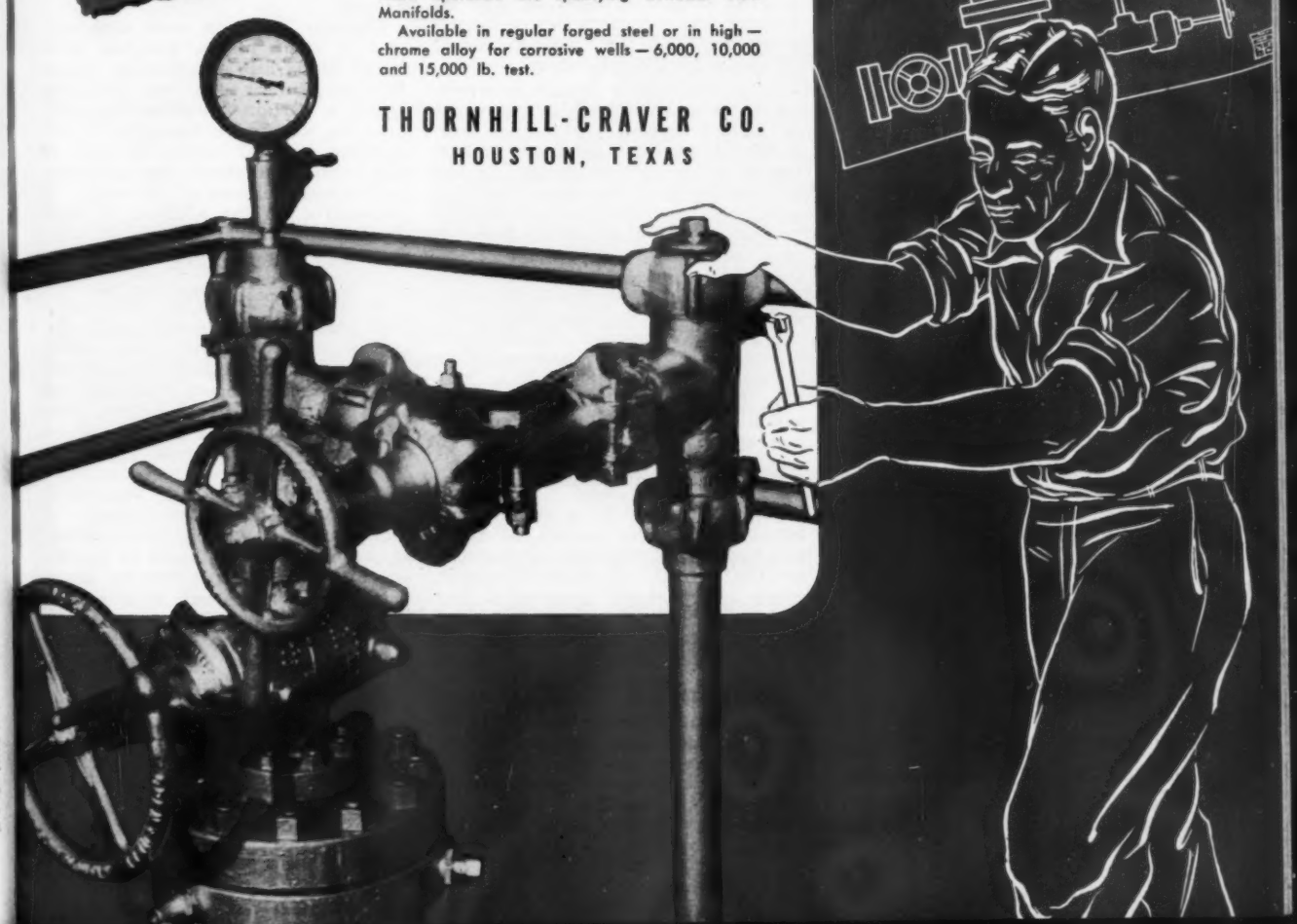

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general, for most gasoline plants, acid purchased in drums may be considered more desirable from the standpoint of economics and convenience in handling.

Various methods of introduction have been used, some of which include the use of a proportioning pump, gravity feed, siphoning, and aspirating. Of these methods, the authors believe that the aspirating method offers the least amount of malfunctioning consistent with ease of operation and cost of materials.

A description of this method may be of aid to the plant chemist who contemplates the use of pH control by acid treatment or who is currently troubled with imperfect functioning of his acid-introduction method. (See Fig. 1). The authors are indebted to R. Whittington of Stauffer Chemical Co. for his description of the design of the apparatus.

The apparatus consists of a glass water aspirator which is connected to a water source of constant pressure, approximately 25 psi. Water at this pressure is usually available from the discharge side of the cooling system circulating pump. Pressures much in excess of 25 psi. are to be avoided for obvious reasons.

The suction created by the water action in the aspirator draws acid from the drum through a ¼-in. metallic lead tubing which extends to within ¼ in. of the bottom of the drum and terminates at the other end in a glass tube of approximately 1-in. diameter and containing loosely packed glass wool. From here the acid flow is regulated by a stopcock.

Attached to the stopcock is a small glass dropper which is centrally enclosed by a glass reservoir connected to the suction side of the aspirator. This reservoir and dropper function as a sort of metering device. By observing the rate at which the acid emerges from the dropper into the reservoir, the plant operator is able to judge the relative rates at which acid is fed into the cooling system. Because of the heat generated when concentrated acid comes in contact with water, it is necessary that all glassware be of Pyrex or its equivalent.

This method is practically trouble-free and requires only a minimum of attention by the plant operator. When changing over to a new drum, it is only necessary to remove the lead tubing from the old drum and place it in the new. Danger of acid spillage is reduced to a minimum; however, it is advisable that the changing of acid drums be handled by someone who has thorough knowledge of the hazards involved. Addition of the supplementary surface-active agent presents no problem, and the best method for introducing this material is usually advised by the seller.

Chemical Control of Tower Waters

The pH of cooling-tower water may be easily checked by the operator with a color comparator. The colorimetric test for pH is simple and accurate enough for routine control tests. Colorimetric tests are usually employed for determination of the amount of surface-active material present. Since procedures followed for determining the concentrations of surface-active material usually vary with the type used, information regarding the test is supplied by the seller.

By periodic samples and a few simple analyses, the chemist can keep himself informed as to the conditions in the cooling-water system. From this information, total solids may be controlled by adjustment of tower bleed. In this way, the maximum number of concentrations may be obtained without reaching undesirable conditions.

Sodium zeolite softened water without supplementary treatment has been advocated and is used in some cooling towers. This method, while successful in removing scale-forming calcium and magnesium ions from the cooling system, has certain disadvantages. Since the possibility of incrustation is eliminated, high cycles of concentration of the water are assumed to be obtainable. However, upon further analysis of the method, it may be found that alkalinity is not reduced by the softener and that high alkalinity results with concentration of the cooling water. The greatest danger in carrying high alkalinity concentrations lies in the deterioration of the wooden tower structure by delignification.

Large amounts of sodium bicarbonate in the water are readily converted to sodium carbonate as higher temperatures are attained. Sodium carbonate tends to concentrate on the wooden parts of the tower and can easily be observed as a white powder on the wood surfaces. Wood deterioration proceeds as the lignin is extracted by the sodium carbonate. The tower loses its structural strength, and its normal life is considerably shortened. To prevent this condition low cycles of concentration must be maintained within the cooling system. This can result in a high consumption of cooling water and an increase in softener operation.

Algae and Slime

Plant-like deposits in cooling-water systems consist mainly of algae and slime. These deposits are formed by the growth of microorganisms which are constantly supplied to the system by makeup water and from the atmosphere. Efficiency of the cooling system is seriously impaired when these deposits act as heat insulators on condenser tubes and when they clog spray nozzles, troughs, and screens. Also, they tend to reduce the effectiveness of tower elements which are designed to disperse water droplets.

Since slime formations are due to the action of bacteria on organic matter, it impossible entirely to eliminate them unless a strictly sterile system is maintained. Such a system is impractical, but growth can be materially reduced by controlling algae development and by keeping the system free of oil and other organic material.

Control of algae growth is a rather unusual problem in that the prolonged use of any one algicide causes the formation of new algae strains which can tolerate the existing environment. This factor necessitates frequent changing of algicidal chemicals so that the algae cannot become accustomed to any one environment. It has been found that the most effective method of applying algicides is by the "shock" treatment, wherein the chemical is periodically applied in large doses so that existing deposits are quickly killed before any immunity can develop.

Copper sulfate, chlorine, bromine, and copper and sodium pentachlorophenate are some of the more widely used algicides. Of these materials, copper sulfate is perhaps the least desirable because algae may easily build up an immunity to it before growth is effectively arrested. Also, copper sulfate has a deleterious effect on ferrous metals in the system. In alkaline waters the toxicity of copper sulfate is reduced by precipitation of the copper as copper hydroxide.

Chlorine has been used with success in some plants, but has been found to be less effective in others. Because chlorine is an oxidizing agent, a certain "chlorine demand" must be satisfied before a sufficient chlorine residual which is toxic to algae can be attained. The biochemical oxygen demand of the waters is responsible for the addition of large amounts of chlorine before its algicidal properties become evident.

Bromine Effective

Bromide, while more expensive than chlorine, appears to be a more effective algicide. Smaller quantities are required to obtain a residue and algae resistance is considerably less. However, bromide is considered to be more hazardous to handle. It can be expected that with all gaseous algicides, certain unavoidable losses will occur because of their volatility.

Copper and sodium pentachlorophenate have been found to be effective algicides, especially for gasoline plants where open cooling systems are common. These compounds are usually in solid form and may be simply dumped into this system, where they quickly dissolve. Since the biochemical oxygen demand has no effect on these materials, and since they are not volatile, no waste due to these factors is encountered. Algae resistance to the pentachlorophenates is considered to be relatively low.

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to determine by actual test the amount of algicide residue present in the water, since good practice requires slug dosages. It is simpler and just as informative to make frequent visual observations of algae growth in the system. When this growth becomes objectionable, the necessary treatment should be employed.

Corrosion

Another important problem facing the gasoline-plant chemist is that of corrosion in open recirculating systems. The equipment losses suffered as a result of corrosion which is not checked may be large. There may also be losses in plant production due to leaks and shutdown for repairs. Aiding in the proper control of corrosion processes is an essential part of the plant chemist's work and as such, should not be neglected.

It is important that the chemist be aware of the causative factors which may be present in the system. The major causes of corrosion are:

1. Dissolved oxygen and carbon dioxide.
2. Low pH water.
3. Intimate contact of dissimilar metals.

Large amounts of dissolved oxygen in open recirculation systems are to be expected because continuous aeration is occurring. Since removal of dissolved oxygen from systems of this type is practically impossible, any iron or steel corrosion occurring may be largely due to this single factor. Free carbon dioxide may be present in varying amounts, since its presence is principally dependent upon the thermal decomposition of bicarbonate salts. Dissolved carbon dioxide, or carbonic acid, reacts with many metals with the evolution of hydrogen and the resultant dissolution of the metals.

Low-pH waters are encountered when alkalinity is controlled with acid treatment. Thus, the possibility of metal dissolution due to the presence of acidic water is prevented. When dissimilar metals are in contact with each other, galvanic corrosion may occur, especially where the anodic area is relatively small as compared with the cathodic metal area. It is wise to avoid contacting dissimilar metals whenever possible.

An effective method of corrosion mitigation is by chemically passivating the metals in the system. By coating the metal surface with a thin, uninterrupted chemical film, pitting corrosion can be arrested. Any further corrosion which may take place will be of a generalized nature, i.e., it will occur uniformly over the entire metal surfaces so that the serviceable life of the metal is prolonged.

It has been proposed that scale-prevention treatment be carried out so that only a thin film of scale which will inhibit corrosion is formed. In practice it is found that maintenance of uniform scale thicknesses is difficult and that heat transfer can be adversely affected. Moreover, the porous nature of scale does not allow an uninterrupted film to be formed, and the resulting exposed metal surfaces can become subject to corrosion.

To effectively passivate the metal surface, the passivating film should be continuous and able to exclude any environment which is conducive to corrosion. Sodium or potassium chromate are considered good passivators. However, these compounds may be somewhat expensive to use, and offer the disadvantage of causing unsightly chromate stains on equipment located in and near recirculating systems.

The phosphate compounds which may be used in conjunction with scale-prevention treatment are considered passivators, provided the pH of the water is maintained within certain limits. Although they are not considered quite as effective as the chromates, it is generally thought they are adequate for cooling-system use in natural-gasoline plants.

Closed Recirculating Systems

Usually, the closed recirculating systems encountered in natural-gasoline plants and booster plants are engine-jacket cooling systems. These systems may consist of the engine jacket and either radiators or cooling coils located in a cooling tower.

The problem of scale formation in these cooling systems can be successfully eliminated by use of cooling water which contains no scale-forming materials. The water used may be either condensate or zeolite softened, both of which are generally available in the plant. Waters such as these are considered practical because the amount of makeup to the system is seldom high, especially when cooling capacity of the system is adequate and there are no serious leaks.

With elimination of scale formation, the problem of corrosion assumes added importance. As was mentioned earlier, use of film-forming inhibitors is believed to be desirable. Many proprietary materials sold as corrosion inhibitors are metal passivators containing chromate.

Chromates are useful for corrosion inhibition in close systems. Once the metal surfaces of the system are coated, and the proper chromate residue is maintained, further treatment may not be necessary for as long a period as 2 or 3 months, depending upon the volume of makeup required. It is important, however, to maintain the proper concentration in the water to insure continuous film protection. Once the film is broken, corrosion may be accelerated at the break and pitting can result. Since excessive concentrations of chromate are harmful, a large safety factor may be employed.

Chromate compounds used as corrosive inhibitors are normally in liquid form. They are convenient to handle and introduced into engine-jacket systems.

A successful method for treating engine jackets is by the use of sodium or potassium dichromate with sodium or potassium hydroxide. The dichromate salt in the presence of sodium or potassium hydroxide reverts to the chromate. The chromate salt formed is the film-forming corrosion inhibitor. This method is less expensive than the use of the chromate salt by itself.

There are various means of introducing the compounds into engine-jacket systems. A chemical feeder is perhaps the most convenient, but many installations are not so equipped. It is possible to mix the compounds and then introduce them either in the dry state or in solution through a vent in a surge tank or a standpipe. Quite often, though, the vent is almost inaccessible and sometimes it may be of such small size that it clogs easily.

At a booster plant, the authors solved the problem of chromate introduction by devising a small injection apparatus which has proved useful. This injector, shown in Fig. 2, consists of a cylindrical steel vessel approximately 18 in. in diameter and approximately 2 ft. in height. At the bottom of the vessel is a 1-in. outlet which can be connected easily to the jacket system at a valve on the bottom of the standpipe. The top of the vessel is provided with a 6-in. opening which is fitted with a screw cap having handles for tightening. Also, at the top of the vessel is a ¼-in. opening fitted with a nipple and a tee. One opening in the tee is connected to a source of compressed air which is normally used for starting the radiator-fan engines. The other end of the tee is open.

For operation the 1-in. outlet is connected to the engine jacket and one side of the ¼-in. tee is connected to the compressed-air supply. The 6-in. cap is removed, and the required amount of dichromate and hydroxide placed in the vessel. Water from the engine jacket is then allowed to flow into the vessel until it is about half full. The cap is then replaced and tightened and the air is turned on. Close control of pressure in the vessel is maintained by obstructing the open end of the tee with the thumb. Contents of the vessel are discharged into the cooling system via the engine-jacket standpipe. The procedure is usually repeated in order to flush out the apparatus. Observation of the water-level change in the standpipe gage glass indicates when the vessel has been emptied, and minimizes the possibility of injecting large amounts of air into the system.

Although the yellow color of the water in the gage glass gives an indication of the amount of chromate

residue present in the system, it is advisable periodically to check for chromate content. This can be done approximately by a colorimetric comparison, or more accurately by a chromate determination in the laboratory.

Boiler-Water Treatment

Steam requirements in the average-size gasoline plant are usually supplied by low-pressure boilers operating below 300 psi. For this reason, the following discussion will be limited to relatively small-steam generating equipment.

Essentially, steam generators consist of three main parts: the boiler proper, the feedwater system, and steam and condensate lines. Difficulties arising from improper water treatments and incorrect boiler operation will occur in these parts and in that part of the plant process equipment which requires steam. As with cooling systems, one of the major difficulties in boiler operation is the formation of scale on heat-transfer surfaces. This incrustation can not only reduce heat transfer, but can also cause tubes to bulge or rupture so that replacement is necessary.

Scale treatment.—Boiler-water treatment may consist of either internal or external treatment or a combination of both. The most common method today utilizes both internal and external treatment. Typical of external treatment in the natural-gasoline plant is the removal of total hardness from feed water by zeolite softening. Because incrustation within the boiler is not entirely eliminated by softening the feed water, internal treatment is used to remove the remaining objectionable compounds in the water. Internal boiler treatment may be primarily the addition of a complex phosphate material and an organic, surface-active colloid. The mechanism of treatment involves precipitation of potential scale-forming compounds by the complex phosphate and retention of the precipitate in fluid sludge form by the colloid so that the sludge may be easily removed by blowdown.

Foaming and carryover. — Another problem that concerns the chemist is foaming within the boiler. Foaming leads to carryover and results in impure, wet steam. As alkalinity and total solids concentrate in the boiler water, the foaming tendency increases until carryover occurs. Dissolved solids carried over by the steam are deposited in steam lines and turbines where they obstruct steam flow.

Presence of oil in the water contributes to foaming and should be removed. Modern boiler water conditioners usually contain an antifoam agent. Some of the most effective antifoams are composed of polymerized alcohols and esters which can allow high water concentrations before carryover develops.

Carryover may be detected by obtaining steam samples and determining the dissolved-solids content either by the conductance method or by gravimetric means. Since boiler conditions are prone to change rapidly, a desirable method of detecting carryover is one which will give an immediate indication. Steam-purity indicators which measure steam conductivity are sometimes placed on a line so that a check of any occurrence of carryover can be obtained. These indicators may either continuously record the results or actuate a warning alarm when conductivity exceeds specified limits.

Corrosion. — Although the plant chemist may have dealt satisfactorily with scaling and foaming problems in the plant boilers, he may be plagued with corrosion problems. Corrosion in steam-generation systems is usually most prevalent in steam and condensate lines. The cause is usually due to the presence of dissolved oxygen and/or carbon dioxide. Dissolved oxygen may be carried into the boiler by makeup water. Free carbon dioxide may also be present in smaller amounts in feedwater. Most of the carbon dioxide is formed by breakdown of bicarbonates. The carbon dioxide escapes with the steam and contributes to corrosion by forming carbonic acid.

Dissolved oxygen can be eliminated successfully by either deaerating the feedwater, or by addition of oxygen-consuming chemicals such as sodium sulfite. In some instances, a combination of these two methods is used.

Carbon dioxide is more difficult to eliminate. Addition of calcium hydroxide to the boiler water has been used, but this method increases the possibility of scale formation. Maintenance of low-alkalinity concentrations may be of some value, but any elimination of carbon dioxide is at the expense of large volumes of blowdown. Venting of condensate helps, but total removal of harmful carbonic acid by these means is difficult.

Amines and phosphates.—Perhaps the most promising means of corrosion prevention is by treating the steam lines with chemicals which will either neutralize the acidic condensate, or will passivate the lines by forming a continuous film on the metal. In steam or condensate systems, the acidic nature of the condensate can be neutralized by addition of one of the copper amines. It is important that there be no metals such as copper and its alloys present unless close pH control of the condensate can be maintained.

In recent years certain phosphate compounds has been tried for condensate corrosion prevention. These compounds form a thin film on lines subject to corrosion and thus exclude any corrosive environment from the metal surfaces.

It is simple for the plant chemist to determine the presence of free carbon dioxide and dissolved oxygen in the boiler system. The Winkler test for dissolved oxygen and the test for free carbon dioxide may be made easily in the field. Tests run on the boiler feed water downstream from the deaerator are valuable in determining efficiency of deaerating equipment and enable the recommendation of appropriate adjustments in venting. A check of live steam and condensate will inform the chemist of need for corrosion-inhibiting treatment.

For routine boiler control, a simple means should be provided for recording the boiler-water tests. A helpful method is to graphically represent daily test results on a chart. Usually, the boiler operator runs periodic tests for alkalinity, dissolved solids, and chloride concentrations in the boiler-blowdown water. If results of these tests are plotted daily on a graph, a quick look at the chart will indicate the proper or improper operation of the boiler, and whether the treatment being used is able to accomplish its purpose under the condition shown.

Idle-boiler protection. — Corrosion within the boiler itself is usually not encountered because of the relatively high pH of the boiler water. However, idle boilers may be subject to corrosion and they should be properly prepared to avoid such possibility. The boiler should be completely filled with water of high pH and enough sodium sulfite to obtain a safe residue should be added. This method is convenient for standby boilers as the boiler can quickly be placed on the line. Boilers remaining idle for long periods may be treated as a closed engine-jacket system by filling them completely with water and adding a film-forming corrosion inhibitor.

Water Softening by Ion Exchange

Gasoline plants usually must be located reasonably close to the source of incoming wet gas and consequently there is seldom a choice of water supply. The water to be used often possesses such undesirable characteristics that primary treatment is necessary. This treatment may consist of sodium zeolite softening, hydrogen zeolite softening, a combination of the two, or lime soda softening.

Of these treatments, sodium zeolite softening is the most common in natural-gasoline plants. Since sodium zeolite softening finds such wide use, the plant chemist is likely to be most concerned with this method. From the standpoint of operation it is considered one of the simplest treatments to use. However, unless the chemist understands the phases of its operation, problems may arise which may be difficult to diagnose.

It is important that certain characteristics of the raw water be considered before any mineral is used for softening purposes. High or low

pH waters have a detrimental effect on the mineral. Waters containing a high ratio of suspended solids tend to coat the mineral particles so that softening capacity is noticeably affected. Ferric iron in the water also reduces softener capacity. High-hardness waters require minerals having a high ion exchange capacity.

A daily record of softener operations should be maintained so that a periodic evaluation may be made regarding softener efficiency. From this record, the chemist can determine the average number of gallons softened per cycle and the amount of salt used for regeneration. From these data, together with the known hardness of the raw water, the chemist can determine softener efficiency and can also check on the amount of salt used per thousand grains of hardness removed. Should the softener capacity prove to be greater than usual, it may be due to a decrease in raw water hardness, or an increase in the amount of salt used for regeneration. It may be advisable to correct a situation such as this because continuous operation of the softener at or near its upper capacity limit tends to decrease the activity life of the mineral.

If records should show an appreciable decrease in softener efficiency, the raw water may have increased in hardness, the mineral activity may have decreased, the amount of mineral in the softener may have been depleted by attrition or other means, or channeling due to high flow rates may have occurred.

If no increase in raw-water hardness is apparent, the softener vessel should be opened for inspection. The chemist should look for evidences of channeling, loss in height of mineral bed, and presence of foreign matter in the bed. Several samples of the mineral should be taken to the laboratory for evaluation. Measurements should be taken of the mineral bed so that the actual volume of mineral in the softener unit may be determined. Once the exchange capacity of the mineral is determined in the laboratory, it is a simple matter to determine the exchange capacity of the softener.

Testing Zeolite Capacity

The evaluation of the mineral in the laboratory is a simple test involving a known volume of zeolite through which is passed a standard calcium chloride solution. The effluent is tested for hardness at frequent intervals and the volume of calcium chloride passed through is noted. When hardness is detected in the effluent, the mineral has reached its exchange capacity and the volume of calcium chloride solution used is recorded.

By calculation, the amount of grains of hardness removed per volume of sodium zeolite used is related to the number of grains removed per cubic foot of mineral. The results of tests on several samples are averaged in order to obtain an exchange capacity representative of the entire mineral bed in the softener. This test is valuable in determining if replacement of the softener mineral is necessary.

Accurate control of sodium zeolite softening operation is an important part of the boiler operator's duties. It is easy to realize the dangers involved in allowing the softener effluent to carry hardness concentrations. Where softened water is used for boiler feed, engine-jacket systems, or cooling towers, calcium and magnesium hardness can be a direct factor in the formation of scale.

A water meter located on the softener line is essential to proper softener control. Observation of the number of gallons passing through the softener before regeneration during the last cycle is helpful in informing the operator when tests should be made to check for hardness of the effluent. When the volume of water softened during the cycle approaches within 4,000 to 5,000 gal. of the total volume softened during the previous cycle, samples of the effluent should be checked for hardness.

A test for hardness should be run after the softening of every 500 gal. until hardness concentrations are found. When hardness is determined to be present in the effluent, the softener should be taken off the line and the standby softener or soft water storage should be used.

Softener Control

The test used in most plants for total hardness is the soap hardness method. This method is not considered as wholly satisfactory because it can be low in accuracy and subject to human error in determining end point. It is possible for two operators to obtain wide differences in test results on the same sample.

The authors believe that a more accurate, simpler, and more rapid test is the colorimetric method. This method for determination of total hardness involves titration of a water sample with an organic sequestering agent in the presence of an indicator. In the presence of calcium and magnesium ions the indicator is red and when these ions are sequestered the indicator turns blue. The end point is sharp and reproducibility of results is excellent with different operators. With this method, as little os 2 p.p.m. of total hardness as calcium carbonate may be detected in the softener effluent. When prepared in the laboratory, the solutions cost no more than the standard soap solution.

Conclusion

The chemist's role in water treatment for natural-gasoline plants, as in other phases of operation, may be summarized as the maintenance of effective operation with maximum economy through chemical control.

After establishing initial problems by a careful interpretation of the analysis on the water supply available, the chemist must examine and recommend the method of treatment that appears most likely to fit the condition. The next step is the determination of control tests to insure a successful method of applying the treatment. With control tests installed, proper instruction to non-technical personnel on the correct procedure desired in these tests is essential.

Periodic sampling and analysis of all plant waters are necessary to make certain that conditions are satisfactory and that treatments are yielding the desired results.

Stubbing Drill Collars by Thermit Welding

(Continued from page 71)

left in the mold around the ends of the drill collar. Because the weld metal is so hot, it fuses part of the drill collar and mixes with this metal, forming a very good bond. About 50 per cent excess metal is used for the weld, involving about 75 lb. of welding compound for drill collars of 8-in. diameter.

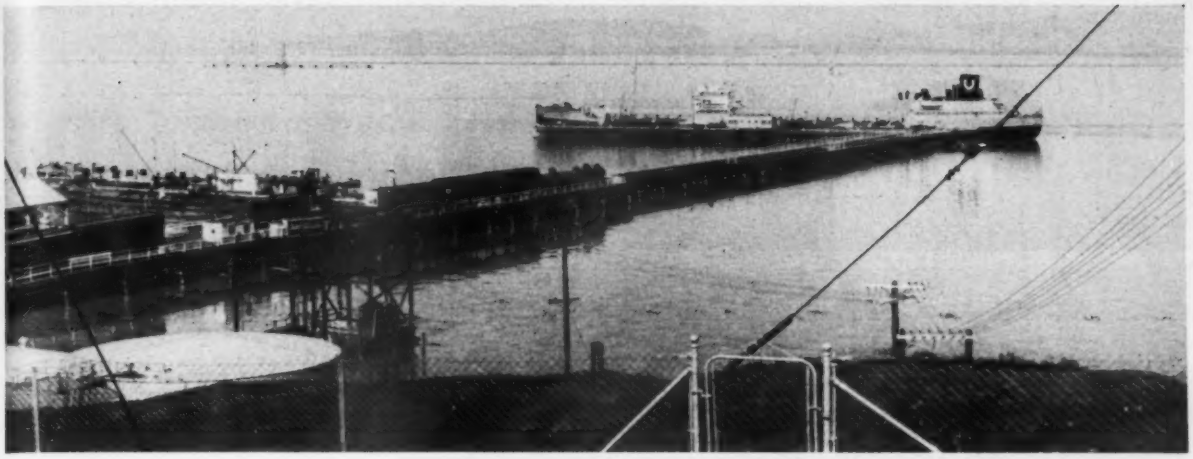
After the weld metal has cooled, the mold box is broken down and the two halves of the mold removed. The molding sand, by now very hard, is broken away from the weld metal, leaving the metal in the weld and in what were the various risers and gates (holes) leading into the weld through the mold. These risers are then cut away with an acetylene torch and the welded portion of the drill collar placed in a furnace and heated to normalize and relieve any stresses that may have developed as a result of temperature differences between the weld metal and drill-collar metal.

After normalizing, the excess metal is machined off the outside of the collar, and the weld metal and bar inside the collar are bored out.

BOOKS

DISCOVERIES OF 1950—TEXAS, NEW MEXICO, COASTAL LOUISIANA. By J. Frank Gardner. Published by Petroleum News Corp., Box 331, Houston. $15 to non-subscribers, $10 to subscribers.

This plastic-bound, loose-leaf volume is a comprehensive review of new oil development during 1950 in Texas, New Mexico, and Coastal Louisiana. The material included is arranged in sections, and each section is individually indexed. Within each section are three categories of "discoveries": (1) "New Fields"—discoveries drilled on structures that have not produced, or those located more than 2 miles from the nearest producing well; (2) "New pools"—discoveries drilled on already-productive formation lying above, below, or to one side of (1 to 2 miles away) previously productive pools, and (3) "Extensions"—discoveries producing from previously productive pool, but lying 1 mile or more (up to 2 miles) away from the nearest producing well in that same pool.



Wharf at Union Oil Co.'s Oleum, Calif., refinery.

Union Oil Loads 105,000-Bbl. Tanker In 5¾ Hours With Twin Pipe Lines

A vessel warped into position at the wharf at breakfast time can be loaded and the manifest completed for a departure at noontime.

TO expedite intraplant shipments of crude oil and finished refinery products, Union Oil Co. of California recently constructed a set of "twin" pipe lines in its refinery at Oleum, Calif. These pipe lines were laid during the period of plant expansion and modification to take care of expanding markets for its "7600" gasoline and "Royal Triton" motor oils. The new pipe-line system makes possible receipt of crude-oil shipments into the plant from tankers in a much shorter time than before, and also completed products can be pumped into clean cargo vessels without undue delay.

Union's marine terminal at Oleum was built to berth several tankships and barges, simultaneously. Oil from Santa Maria and other points is brought through Golden Gate and across San Pablo Bay in addition to crude being shipped by crosscountry trunk pipe lines. With the limited pipe-line system in the refinery, unloading frequently required 24 hours to transfer 105,000 bbl. of oil. Loading out a cargo of finished products required less time due to the downhill travel and lower viscosity of the material.

Tanker connected to intraplant pipe-line system.

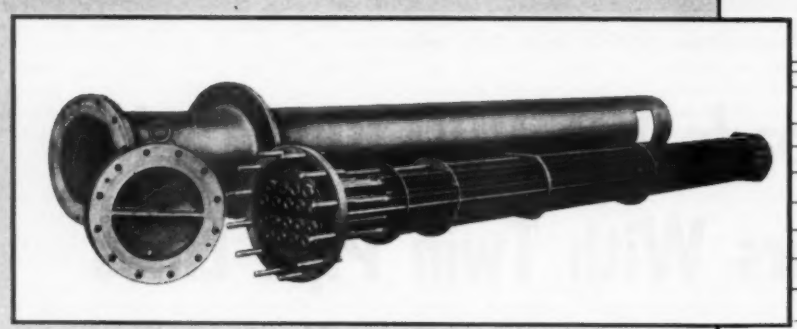
The new system of intraplant pipe lines consists of two 16-in. trunk lines leading from the wharf to a farm above the refinery. The new lines are laid besides the former piping beneath the deck of the wharf where fittings for hose connections are located at a convenient level.

At the limits of the plant area, the new lines rise aboveground on structural-steel stanchions set in concrete. At the central distributing station in the heart of the refinery, these new lines enter the pump house through the building gable and continue as a complete manifold above the pipe line and intraplant shipping pumps.

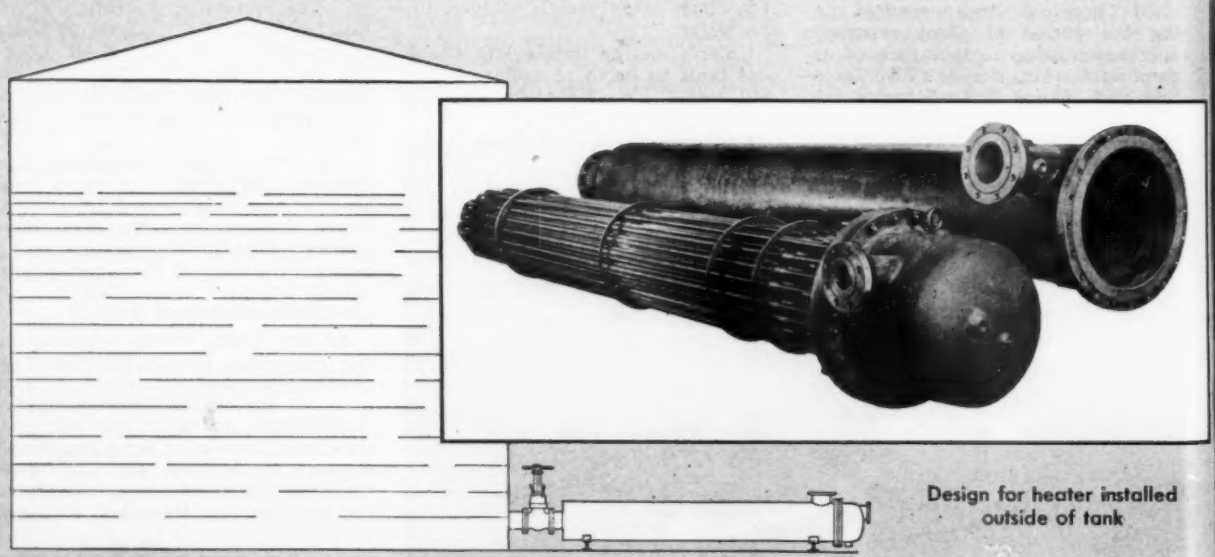
From this point, the new lines make a right-angle turn towards the tank farm east of the refinery. Still aboveground the lines continue to be supported by stanchions high enough to permit any truck and trailer to pass along refinery streets. For the

XUM

Why G-FIN..... for S



Design for heater installed partly within tank



Design for heater installed outside of tank

GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS

XUM

Storage Tank Oil Heating

Here is the most practical unit for heating oil to be withdrawn from storage tanks.

The effectiveness, compactness, dependability and ease of inspection and maintenance of the G-Fin Storage Tank Oil Heater have made it widely used for every type and grade of viscous oil.

Some of the outstanding features of this heater are briefly outlined in the column at the right. These features are based on the unequalled G-R experience of more than 80 years in the design, manufacture, and operating results of many hundreds of thousands of heat transfer units. When you buy a G-Fin Storage Tank Oil Heater, you get authoritative ratings, skillful design which is exclusive in many respects, sturdy construction with accurate machine work, and proven performance.

Write for bulletin describing these units in detail.

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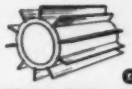
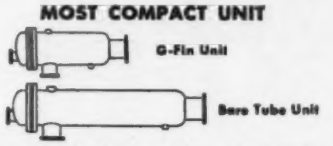
G-FIN STORAGE TANK OIL HEATER FEATURES



G-FIN EXTENDED HEATING SURFACE

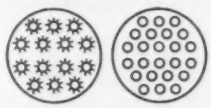
The G-Fin elements have eight times more heating surface than bare tubes of the same cross-sectional area and length.

MOST COMPACT UNIT



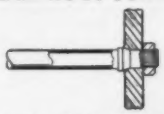
The increased heat transfer surface of the G-Fins means more heating surface in a given volume, and thus least heater space for a required duty.

FEWER TUBE JOINTS



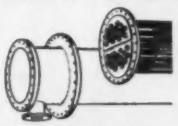
The small number of G-Fin heating elements results in a minimum of tube joints.

LEAKPROOF JOINTS



The conical ends of the G-Fin elements are seated in the tube sheet with accurately machined metal-to-metal joints held tight by lock-nuts.

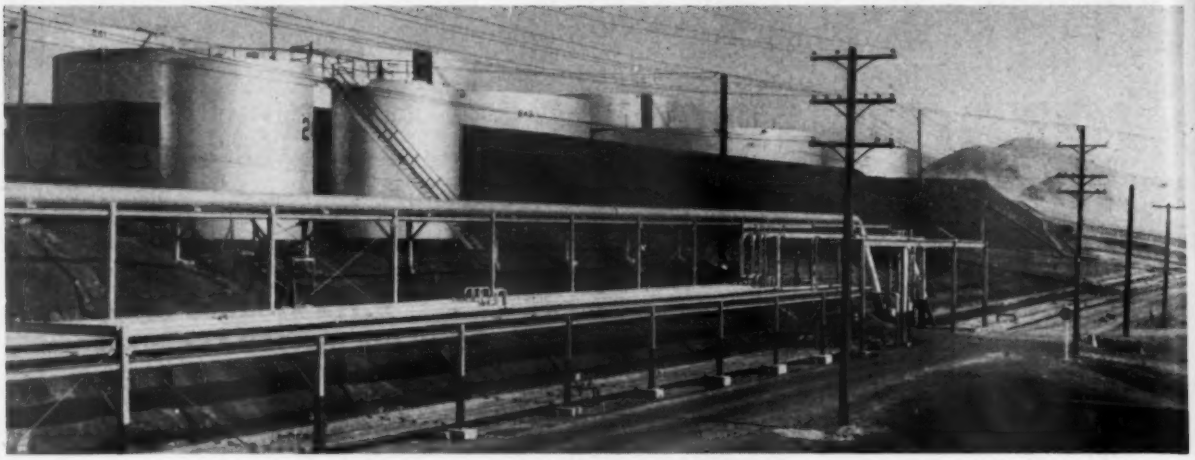
ACCESSIBILITY FOR CLEANING



By removing lock-nuts at the tube sheet, individual G-Fin elements can be removed from the heater for inspection, thorough cleaning or replacement.

GR-281

GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS



Two 16-in. overhead pipe lines in the new pipe-line system at Oleum.

These lines terminate at Union Oil Co.'s wharf in San Pablo Bay.

most part, these stanchions are single I-beams equipped with crossmembers welded to their upper ends. Crossmembers are made from wide structural channel positioned to provide a surface for attaching the pipe-line carriers. Instead of resting directly on the channel, concave rollers with shaft bearings are set to support the pipe. These rollers permit the line to move with complete freedom during expansion and contraction. On steep grades, the uphill section of the lines is anchored in substantial concrete piers. Overbends and loops near the low end provide sufficient slack to prevent excessive strain as the lines expand or contract.

New pumps are installed in an extension of the central pump house to take care of increased pipe-line capacity. Two centrifugal units, each with a capacity rating of 3,500 bbl. per hour, are driven by 400-hp. electric motors. Another pump which also has a capacity rating of 3,500 bbl. per hour, is driven by a 500-hp. electric motor.

Manifolds are built into the system so that any combination of pumps required can be used to handle crude oil or finished refinery products. The new lines extend into the previously built pump room so that the original pumps can also be connected through manifolds to suction or discharge, as the case may be. A total of 2,100 hp. is installed in the current central distributing pump room.

As bulk products are loaded into tankers while crude oil is being received from others, one of the new pipe lines carries clean oil while the other transfers fresh refinery charging stock. Loading products into tankers is accomplished with the added facilities so that constant rates ranging up to 18,000 bbl. per hour are obtained. Timed loading shows that a tanker having a carrying capacity of 105,000 bbl. can be topped off in 5¾ hours from start to finish. These rates are not unusual, so a vessel warped into position at the wharf at breakfast time, can be loaded and the manifest completed for a noontime departure, and be out on the high seas before night. Likewise, when a tanker of crude oil arrives at Oleum, the time table is shortened materially, as the ships pumps deliver the oil to the central distributing pump house where the high-capacity pumps move it to designated storage so that the vessel can be released in time to leave the same day.

Pumping equipment for the 16-in. intraplant pipe-line system at Oleum.

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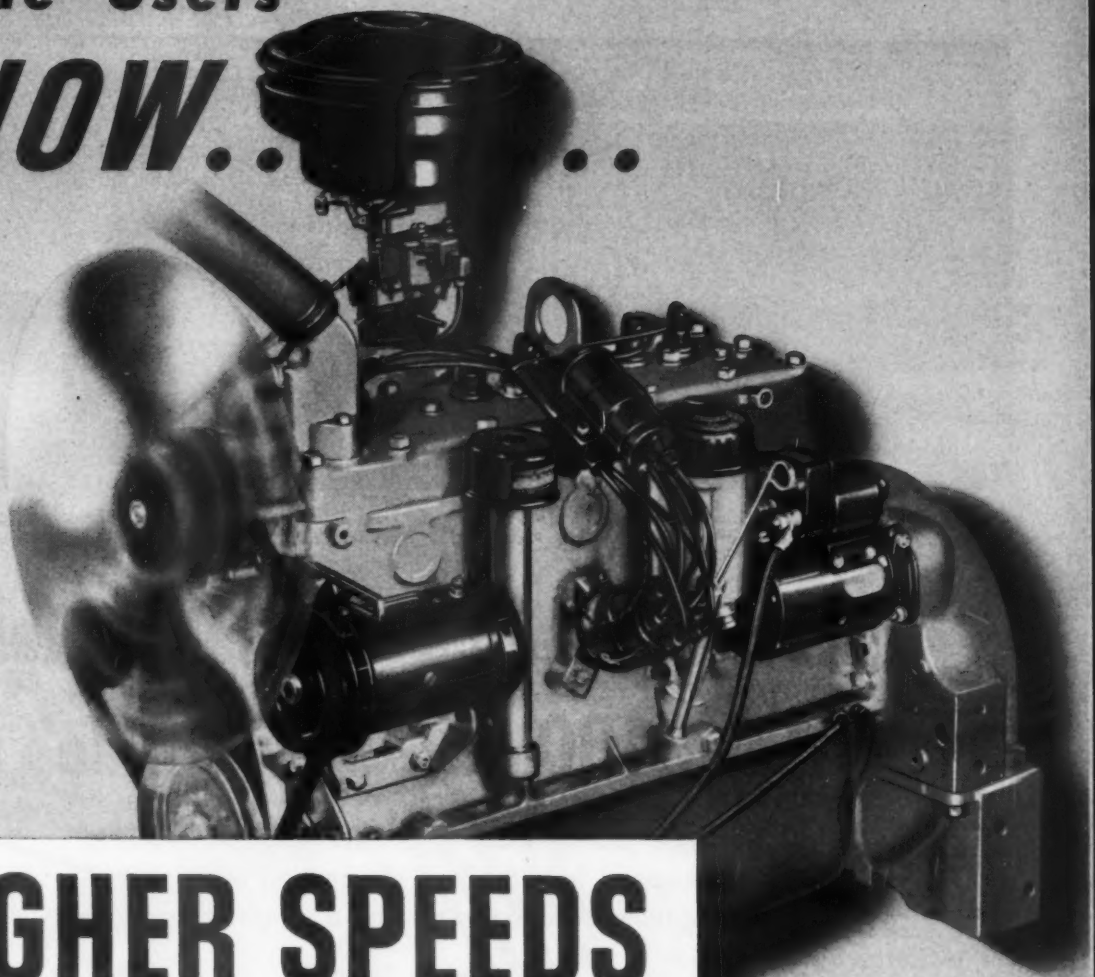

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HORSEPOWER WITH A PEDIGREE

Start of the first "pull" in building the dual 12-in. undersea line or Tide Water Associated Oil Co. Three pulls of 900 ft. each were made in laying the 2,400 ft. of dual line into the Pacific off of Gaviota, Calif., location of Tide Water Oil Co.'s marine terminal.

New Submarine Oil Line Takes An 8,400-Ft. "Sleigh Ride"

Dual-line marine-loading project involved working at top speed for 15 hours, dynamiting a coral reef, and battling ocean currents and a rough ocean floor

by James Joseph

PIPE liners worked fast against ocean currents recently to lay dual lines 8,400 ft. into the Pacific off Tide Water Associated Oil Co.'s Gaviota, Calif., marine terminal. Currents and ocean-floor irregularities made the Gaviota construction job even tougher. Once begun, the line laying had to be a continuous, nonstop operation, to avoid "sanding over" as currents piled up sand.

The job involved laying 2,400 ft. of heavy-wall, 12-in.-diameter line, and anchoring it to a buoy via a 120-ft. 10-in. flexible "takeoff" rubber hose —which will be hoisted aboard tankers standing offshore. This is the first dual-line marine-loading project on the West Coast in recent years, and the coast's third dual installation.

Dual lines were necessary because oil from nearby Zaca field is so heavy (8° A.P.I.) that without a circulatory system, it would have been impossible to keep the lines clear. Hot, diluted crude oil will flow through the line from a pumping station about 300 ft. inshore.

At the line's terminus, the pipe was laid 55 ft. below water, resting on the ocean bottom. A coral reef about 75 ft. offshore protruded 14 ft. from the ocean floor, and directly in the path of the work. Divers blasted away this obstruction, using 1,500 lb. of tube dynamite, laid along the reef's edge and held in place by sand. Tubes were in 20-ft. lengths.

Standard-Gage Track Laid

Prior to pipe laying, general contractor, Hood Construction Co., built a 915-ft. standard-gage track. This was necessary to allow for three pulls of 900 ft. of welded pipe each—to keep the pipe laying continuous and without interruption to avoid sanding up by ocean currents. Of the 2,700 ft., 2,400 ft. was laid on the ocean bottom, with 300 ft. of pipe running from the high-water level to the shore pumping station. Dual lines were laid 4 ft. on center.

Tracks were laid on 7-ft. ties, 5 ft. on center, and the track was greased. In fact, the contractor bought up the entire lard supply of a local grocer during the operation.

The 12-in. pipe came in 40-ft. lengths, and these had to be welded into six 900-ft. "pull sections." Pipe was welded and laid alongside the track. Sidebooms lifted the 900-ft. sections onto cradles which were spaced along the track to carry the load. Cradles were constructed by joining two 2 by 12-in. timbers together, attaching 2 by 3-in. angle irons to their undersides to hold the cradle to the rails, and by notching 2 by 6-in. timber fastened to the cradle's topside to fit the pipe. Cradle angle irons and undersides were likewise greased.

All pipe joints which were to be in contact with abrasive currents—some 700 ft. of the inshore section—were

It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast.*

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

All of us must now make sacrifices for the common good. But we're working for the biggest reward of all —*peace with freedom!*

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series D
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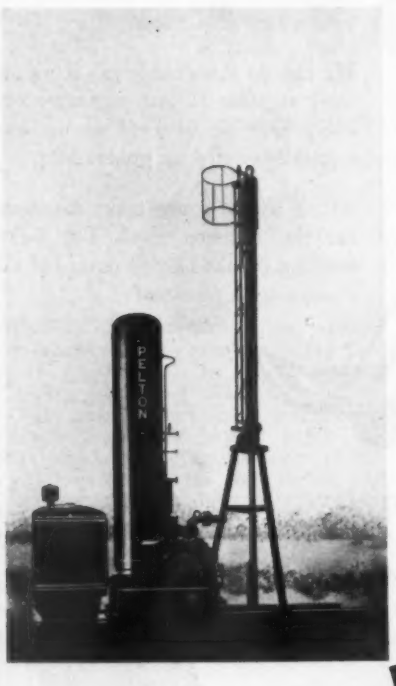
polished rod load rating 20,000 lb.
for heavier production in shallower fields



With a 10 ft. surface stroke and a 20,000 lb. polished rod load rating, this new small PELTON Series "D" Hydraulic Pumping Jack enables an operator to benefit from all the advantages of Long Stroke Hydraulic Pumping at a cost competitive with conventional units of much shorter stroke.

The new 10 ft. "D" Jack retains all of PELTON'S exclusive features including triple screw positive displacement pump and full hydraulic reversing controls.

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For simplicity and ease of operation — for high production at low cost — and for the most modern pumping method in the field today, insist on Long Stroke Hydraulic Pumping Jacks as built by PELTON — engineers in Hydraulics for 70 years.

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constructed with a welded sleeve over the girth weld to prevent abrasive action by the sand. Split sleeves were used. These were held tightly against the lower part of the pipe using a 15-ton hydraulic jack to draw the ½-in. chain holding the lower sleeve close. Once securely in place, the lower sleeve was tack-welded over the weld. Then the top portion of the sleeve was fitted over the weld and mated with the bottom part of the sleeve; then the hydraulic jack again was put into play. This time the jack was placed atop the sleeve. About 24 lb. of welding electrodes was used at each sleeve weld.

A main sled, with steel bottom and heavily timbered, carried the forward section of the pipe to prevent the pipe ends from burying themselves in the ocean floor as a 150-ton barge, anchored offshore, dragged the pipe seaward. The main sled was 16 ft. long and 7 ft. wide and carried the bridle as well as a towing bar. Onto this bar was hooked 1,200 ft. of 1⅝-in. steel cable.

A single cable was used for the first two pulls—or 1,800 ft. of dual pipe. After that, three 1⅝-in. cables were rigged to drag the final 900 ft. to the barge. The approximate weight of this pulling, with the full weight of the dual 2,700-ft. pipes upon it, was 150 tons.

When the day of the big pull arrived, Charlie Shearman, superintendent for Hood, had his crews on the job at 7 a.m. They completed the job of laying the line by 10 p.m., using floodlights.

One of the important operations was communication between the offshore winch crews on the barge and shore crews. There was barge-to-shore radio hookup, signal flags, and Tide Water rigged a butane-operated fog horn just to make sure communications would't break down during the operation.

Bulldozers speeded up grading for the special track used in the operation.

One feature of the pipe, besides it being coated with Somastic, was that all field-welded joints were 100 per cent X-rayed. It was likewise tested at 100 psi. air pressure and 800 psi. water pressure.

Divers reported that the pipe-laying operation had been accomplished without damage to the pipe coating.

The particular crude from Gaviota Zaca field is about 8° A.P.I. gravity, which means that the lines must be cleared of this heavy crude after a tanker-loading operation. This is done with diesel oil which is kept in the system until the next loading occurs.

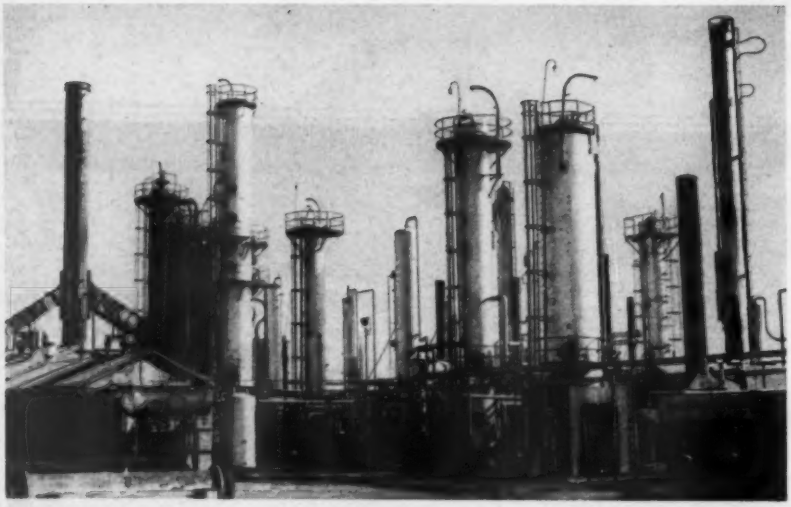
The Zaca crude, even before loading, is cut with kerosine distillate and pumping temperature will run to about 175° F.

The new line is capable of loading about 7,500 bbl. per hour, and is the first installation of the Gaviota marine terminal, presently under construction at a cost of several hundred thousand dollars.

In addition to Shearman, superintendent for the pipe-line contracting company, Frank Cox was pipeman, and C. R. Spaulding was in charge of earth moving—in preparation for the rail slide. Charles N. Rice, San Francisco, supervised the barge operation.

Left: The dual lines were tied together with a U-bend and attached to a "sled," then pulled into the Pacific. Right: The 900-ft. pulls of dual line were assembled on supports resting on the special track. The main sled, seen in foreground, is in position to receive the lines.

XUM



A portion of Rothschild Oil Co.'s refinery at Santa Fe Springs, Calif. The two reaction chambers for the modified thermal cracking unit are located right center in this view of the refinery.

Two Reaction Chambers in Series Increase Refinery Charge Rate

INCREASED demands for finished products in the range of motor fuel prompted Rothschild Oil Co. engineers to resurvey the potential possibilities of its U.O.P. thermal cracking plant at Santa Fe Springs, Calif. The plant was conventional in design, containing the usual single reaction chamber, and had a normal throughput capacity of 4,000 bbl. of topped crude daily.

Feed for the cracking plant was produced by a crude distillation unit in Rothschild's Santa Fe Springs plant which supplied an adequate volume for normal conventional operation. Additional reduced crude was made available by the reactivation of another topping plant, recently acquired by Rothschild, to provide a combined volume of approximately 5,000 bbl. per day of available cracking stock.

Engineers of Universal Oil Products Co. recently developed a method of modification for thermal cracking plants in which two reaction chambers are employed in series. The original reaction chamber in this plant has dimensions of 5 by 40 ft. The second chamber is 5 by 50 ft., and is termed chamber No. 1 The original vessel is called chamber No. 2. While the plant was down for turnaround, the transfer lines were disconnected and the nozzles at the top of chamber (No. 1) rearranged for new piping.

Chamber No. 1 was installed between the two furnaces and the original chamber and connected to the transfer lines from both furnaces, exactly as chamber No. 2 was originally connected. A simple flanged fitting on the outlet from chamber No. 1 replaces the conventional slide valve used in the original single reaction chamber hookup. This outlet on chamber No. 1 is connected to the top of chamber No. 2, as a single line. Outlet from chamber No. 2 is fitted with the original slide valve.

Operational Details

Operation of this modified cracking unit requires that the topped crude be pumped into the main fractionating column above the flashed vapor inlet where a temperature of 600° F. is maintained to produce a maximum of cracked-gasoline vapor. The base product from this fractionator is the charge for the heavy-oil heater of the cracker.

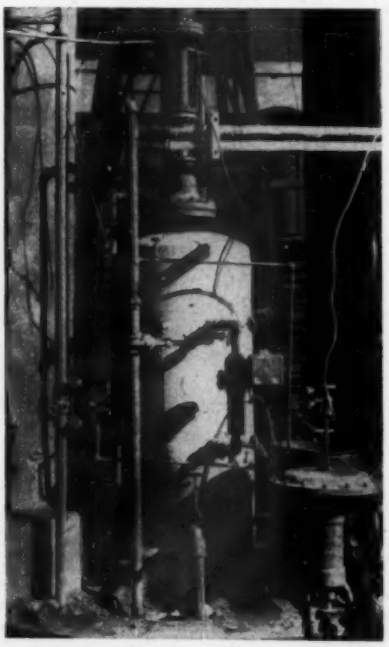
A side cut from the column provides charging stock for the light-oil heater.

Transfer temperatures for the heavy oil are maintained at 910° F., while the temperatures in the light-oil transfer line are held at 1,050° F. The streams from each transfer line combine into a single flow to the top of chamber No. 1. Flow from chamber No. 2 is into a 6 by 40-ft. flash chamber where vapors are separated from the heavy bottoms. Overhead from the flash chamber is released at a temperature of 795° F., while the base is operated at 820° F.

(Continued on page 107)

Left: Piping arrangement for the two reaction chambers in the modified thermal cracker. Changeover from original flow was simplified by installing new nozzles in the vessels.

Right: Secondary flash is accomplished in this small vessel which is equipped with atmospheric cooler.



CORROSION and its control

Pipe-to-Soil Potentials as An Indication of Protection

WHEN a structure has been placed under cathodic protection, an essential part of the project is the final survey, to establish definitely the fact that the entire structure is actually protected. If the structure in question is a pipe line, this usually takes the form of a survey of pipe-to-soil potentials along the line, a plot of which is included as an important part of the report. Two common criteria of protection are in use among corrosion engineers: (1) the establishment of a pipe-to-soil potential at least 0.85 volts negative (sometimes 0.83, and, rarely, 0.80) referred to a copper/copper sulfate electrode; and (2) the shifting of pipe-to-soil potential in the negative direction by at least 0.3 volts. The latter criterion cannot be applied unless there exists a rather complete survey of the line prior to the installation of protection. Other criteria exist, but these are of largely theoretical interest at present, because of the fact that they are slow and unwieldly in application.

Accepting the criterion of 0.85 volts leads to a consideration of the number and spacing of readings required to give reasonable assurance of complete coverage. When the line in question is a well-coated line protected by rectifiers, the coverage per unit is so great that no particular problem ensues, unless the potential in the region of the midpoint between units is very close to the protective level; in this case it would be necessary to take readings at fairly short spacings from the midpoint toward each unit, until a point is reached at which a definite trend is well established.

When the coating is poorer, or when a large number of small units are employed, such as groups of magnesium anodes or small rectifiers, steps must be taken to establish the completeness of protection throughout each section lying between units. The very common practice of taking readings at each anode group and at each midpoint cannot be recommended; there is no assurance that the midpoint is the point of lowest potential, and in fact the contrary is often found to be the case.

The correct interpretation of values actually measured in the field will be facilitated by an examination of the theoretical distribution of potential under certain assumed conditions. Potential change produced along a long uniform line by a single drainage point is exponential: i. e., will plot as a straight line on semilog paper. The potential itself assumes the shape of a gradually flattening curve; this ignores the peaking effect of the anode current in the vicinity of the drain point, which curves sharply upward.

The potential along a section of line between two equal drainage units varies as shown in Curve (1) Fig. 1, the anode proximity effect is shown dotted. In the simplest case, where there are only two of the drainage points on the line, and where they are of equal size, the curve between them (neglecting the anode effect) is a catenary, or the curve assumed by a flexible chain suspended between two points. From a basic characteristic of exponential functions a very important conclusion may be drawn; any point on such a curve may be taken as a starting point.

Suppose there is a large rectifier installed near the center of a very long pipe line, one far too long to be completely protected thereby. Several miles away there is a point on the line at which the potential has been changed by only 0.1 volt; the effects on the remainder of the line, away from the unit, are precisely the same as would be caused by a small unit at the point in question, one only large enough to produce that 0.1 volt all by itself. This is analogous to starting out with a freely suspended chain between two points on the same level, and then simply attaching one point of chain to a solid support without moving it. The remainder of the chain will not be influenced in the slightest.

Two important conclusions may be drawn from this reasoning (they may also be established by mathematical analysis). The curve between two drainage points, where there are others along the line close enough to have influence, is exactly the same as if the two units were replaced by slightly larger units, capable of producing the identical end-point potentials. Secondly, the curve between two points of unequal potential is still of the same mathematical form, a catenary, as in Curve (2).

This means that if the potentials are determined for three points along a section; two near the end, but not so near as to be influenced by the proximity effect, and one somewhere the midpoint, or better, somewhere near the low point; then a catenary

(Continued on page 107)

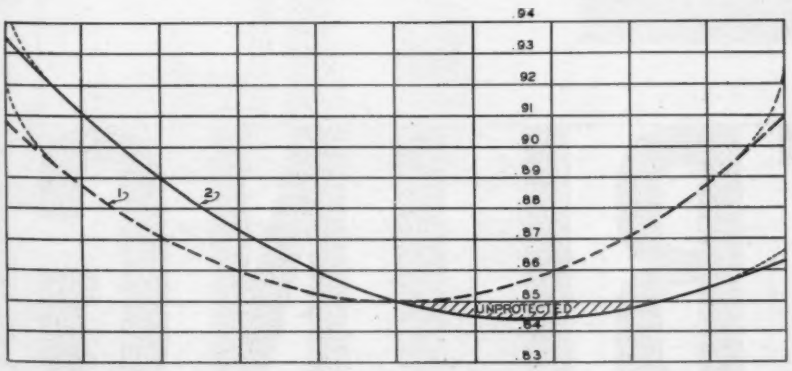


Fig. 1—Catenary potential curves between two cathodic drainage points. Curve 1 equal drainage. Curve 2 unequal drainage. Protective potentials at stations and midpoints does not guarantee full coverage of line.

Part 5 of a series by Marshall E. Parker, consulting engineer, Houston.

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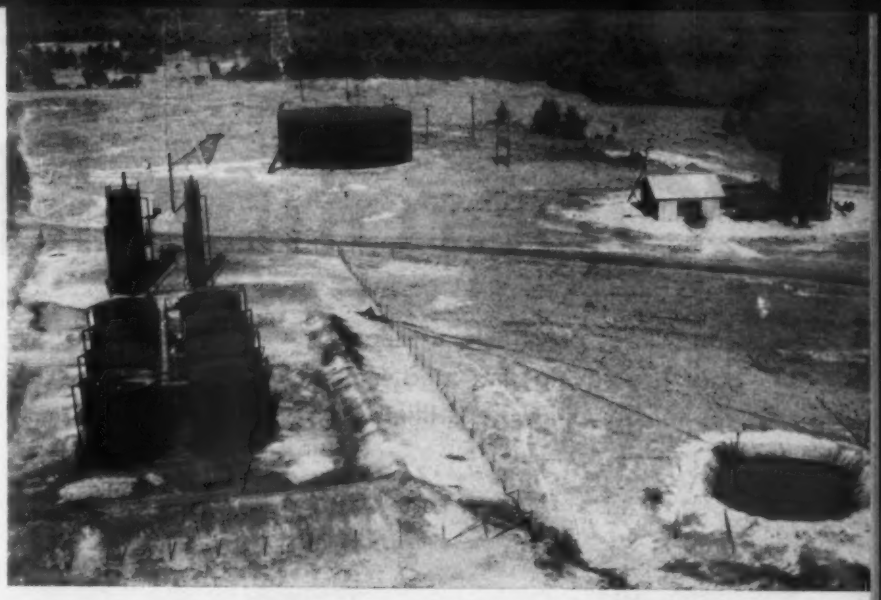


Aerial view of the Wesson Hogg sand unit, Ouachita County, Arkansas. Consolidated battery "D," left; 20,000 bbl. water storage tank and water supply wells, upper left; and injection plant, upper right.

Water Injection Boosts Wesson Pool's Recovery an Estimated 150 Per Cent

by Vernon J. Turner*

Studies showed 12 million barrels recovery by natural means, 24 million by gas repressuring, 30 million by water flooding. Under the last plan, 2 years of operation have increased reservoir pressure from 412 to 1,183 psi.

DEVELOPMENT of the Wesson Hogg sand reservoir is of fairly recent origin inasmuch as the discovery well was completed in January 1946. The operators have been very fortunate that fairly complete geological, engineering, and statistical data are available for this pool.

The early development centered around the southwest quarter of Section 24-T 15s-R 19w, Ouachita County, Arkansas, and from the early performance of the wells the reservoir was thought to be of rather limited size. This assumption was based chiefly on the rapid decline in bottomhole pressure, which necessitated artificial lift for the wells when only 112,170 bbl. of oil had been produced. With further development, however, which eventually extended the pool 5 miles in southwesterly direction, and the accumulation of additional data, it became apparent that the natural reservoir energy was wholly inadequate to provide maximum oil recovery.

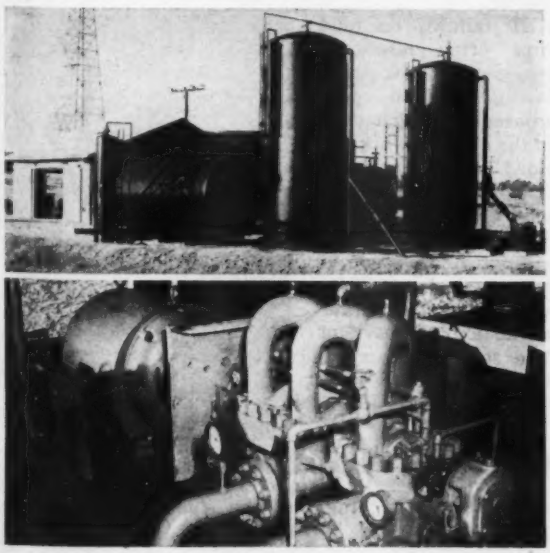
The operators began holding meetings in August 1947 to discuss plans for pressure-maintenance operation. It was agreed at this first meeting that unitization of the various leasehold interests would be absolutely essential to the success of any type of pressure-maintenance program.

Recovery plans. — Two suggested plans were considered involving gas repressuring and water flooding. After much discussion an independent consulting engineer was hired to make a detailed study of the assembled data and to recommend which plan, in his opinion, was most feasible. This consultant recommended water flooding based on the estimated recovery values as follows:

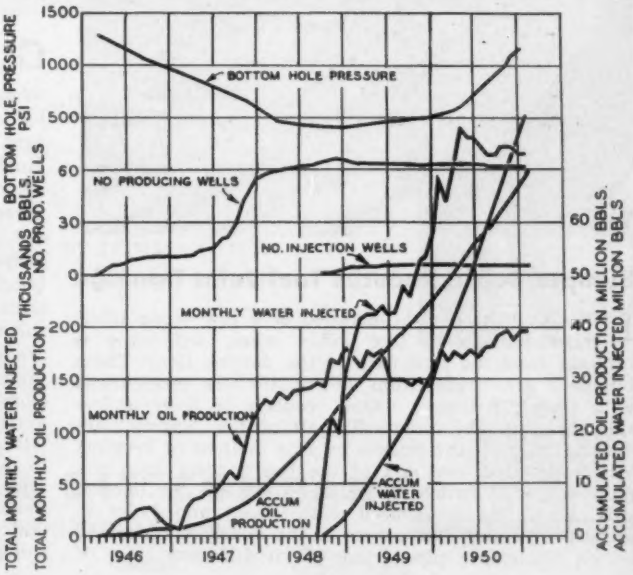
(Continued on page 107)

*Chief engineer, McAlester Fuel Co., Magnolia, Ark.

Injection plant filtering equipment, above, and cast-bronze, six-stage injection pump.

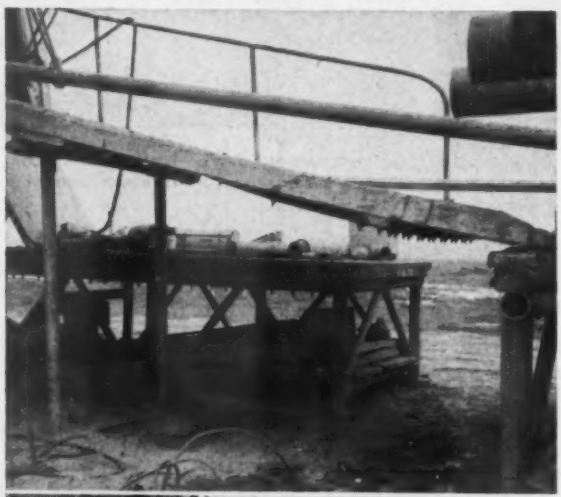


Statistical data on Wesson Hogg sand unit, Ouachita County, Arkansas.



DRILLING Operating Ideas . . .

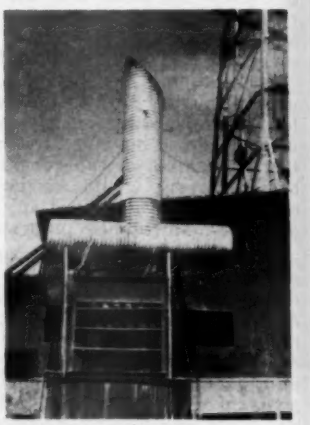
Here are practical installations that are saving time and money for some well-known drilling firms



Bumper Board Reduces Tool-Joint Damage

LONG bumper boards installed at a low angle minimize damage to tool joints when drill pipe is brought from the pipe rack to the derrick floor. These bumpers are made from heavy timbers crossbraced with timber A-frames bolted securely to their underside. Sagging and practically all of the "spring" are eliminated from the boards by this method of bracing. When installed, one end of the board rests upon the pipe-rack wall structure, and the other on the derrick sills. Each end is secured with cleats and bolts to prevent creeping. The center of the board is supported by an adjustable pipe frame. Two different sizes of pipe, with matching holes through both members for pins, are used for adjusting height. To prevent gouging the timbers of the bumper boards by female sections of the tool joints, the board's surface subject to such damage is covered with a single steel sheet bolted in place. To guide the joint of pipe to the derrick, and to prevent it from gouging the rope treads, a single joint of 2-in. pipe is bolted to the floor at the edge of the walkway section. This idea was originated by Signal Oil & Gas Co.

Auxiliary Muffler for Multicylinder Engines



AN auxiliary muffler for a group of multicylinder diesel engines was constructed by Bell & Burden Drilling Co., Los Angeles, to further reduce exhaust noises while drilling in heavily populated areas. The unit is made of ordinary corrugated culvert and is arranged in the form of an inverted tee. Seams are both riveted and welded and the silencer is supported by a pipe frame which rests upon the cooling unit through which water is circulated for the hydraulic brake. The silencer occupies the same relative position to other equipment regardless of where the well is being drilled. Exhaust pipes lead from the primary mufflers through the sheathing of the rig to the auxiliary muffler. Exhaust gases pass to atmosphere through the vertical of the auxiliary muffler or silencer.

Mud-Pump Shields

GASKET failures on mud pumps often result in upsetting good housekeeping by allowing mud to spray over adjacent equipment. Much of the cleanup work can be avoided in such instances when a shield is installed at the pump. Shields for this purpose used by Rocky Mountain Drilling Co. are made of light-weight steel plate or sheet which in some instances are set into a framework of pipe. The shield has extensions on the lower end of the vertical sections of the frame which can be bolted directly to the bed plate of the pump. One used at the side may be made of heavier stock to be used without the framework and attached to the piping and the side of the framed shield with gate hinges. Ferrules attached to the piping

Meet another strong booster for
REED *Super Shrink-Grip Tool Joints*

Mr. Herb Rhoten, Drilling Superintendent for E. K. Carey Drilling Company, at McPherson, Kansas

Mr. Rhoten says, "**REED** Super Shrink-Grip Tool Joints help me keep down drilling costs in two important ways: first, they give long service; and second, they can be replaced right at the rig."

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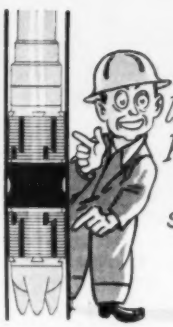

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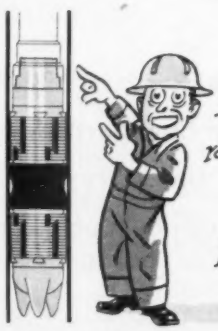
--simple, positive setting resists pressure up or down



--removable ram adapter means faster knock-out

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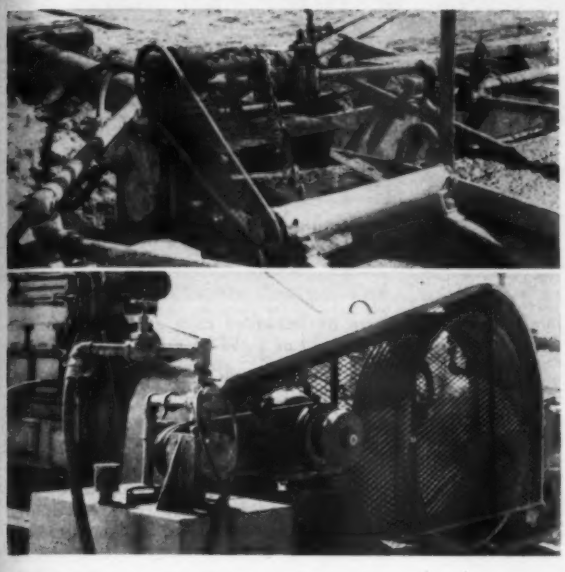
and the frame of the shield receive the hooks of the gate hinges so it may be removed without difficulty.

Hydraulic Power

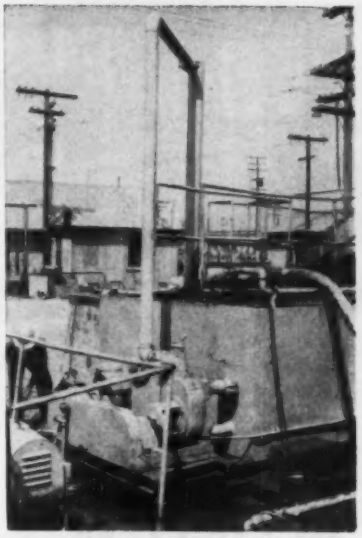


THESE photographs show how electricity may be eliminated as shale-shaker power supply. A rotary pump driven from mud-pump drive takes the place of a generator. The hydraulic power is transmitted to the shale shaker by piping, and the fluid there powers a small rotary-fluid motor. This system adequately meets power requirements, and runs only when needed. It starts and stops with the mud pump.

Ring Covers

CONCRETE deadmen for portable well-servicing machines normally are installed below the surface of the ground and fitted with rings to anchor the guy lines. These rings often are covered with drifting or other windblown material. To eliminate searching for buried rings, heavy steel covers, not dislodged easily by traffic, may be placed over them. These covers can be made from 12-in. pipe as shown in the accompanying picture.

Mud Degasser



THE equipment in this picture is used to separate entrained gas from drilling mud without pumping from the mud tank. This is accomplished by attaching a rotary pump directly to the end of the tank with a nipple and suction hose. The pump and its 3-hp. electric motor are mounted on a small skid base which in turn is bolted to the mud-tank supporting base and goes along with the unit from location to location. Discharge from the pump flows through a 3-in. line rising from the pump case to a horizontal run which in turn is connected to an 8-in. standpipe fitted with baffles. When gas appears, the pump is started and continues to circulate the mud over and over again until the gas is broken out and the mud returns to normal. This idea is used by Santa Fe Drilling Co.

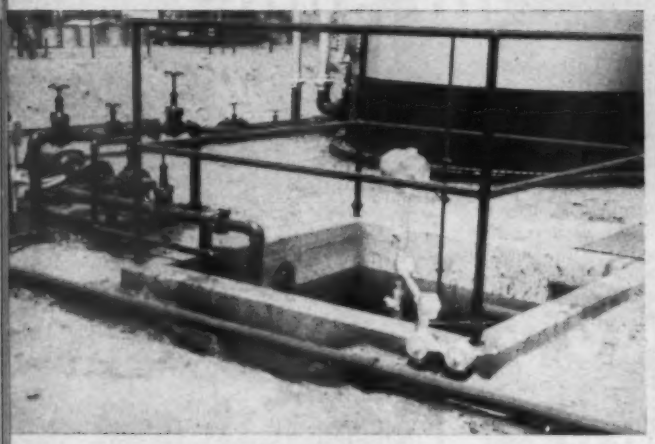
Dog House Washroom

FACILITIES for crew members to wash up have been installed in this dog house. A lavatory in one corner of the building is serviced with running water and waste disposal. The dog house itself is a standard type built of light steel and mounted on skids with tow rings. Supply piping is installed, with the pipe extending through the end of the structure. Water is fed to the dog house from hydrants or other sources through a high-pressure steam hose equipped with ground joint unions. Disposal is effected in a similar manner by using a hose which leads to a cess pool, septic tank, or sewer. Idea used by General Petroleum Corp.

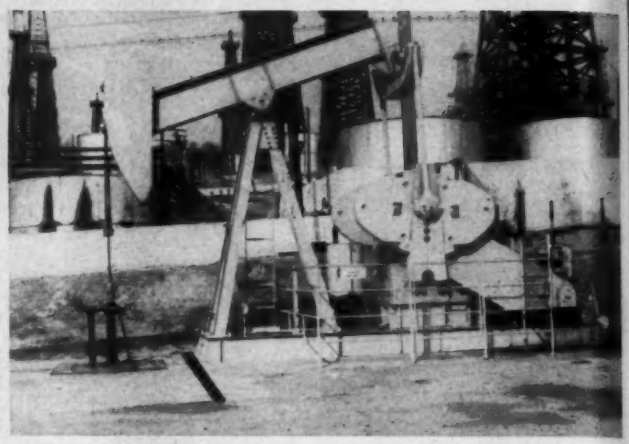
Blowout Preventer

A COMPACT blowout preventer unit is shown here. The connection for the mud-return line is made of a collar welded into riser above the preventers, and fitted with a plain-ended, swaged nipple of the same size as the mud-return line. This blowout unit is mounted on a skid for ease in transportation. Small bolts in two holes hold the preventer securely on its base.

XUM



Waste-water sump on small lease with float-controlled electric pump for removing water.



Pumping unit on well where an imbedded color stripe is placed in pulling-machine pad as guide for driver.

Richfield Modernizing Leases in California's Long Beach Field

. . . and the improvement is more than esthetic— It is paying off handsomely in dollars and cents . .

STANDING out in sharp contrast against a backdrop of ancient redwood derricks in Long Beach field, California, are a number of scattered leases which have been completely modernized. The wells on these modernized leases, like those still supporting the old wooden derricks, were drilled in the heyday of intense promotional and legitimate activity in this big field.

The expense of maintaining wooden derricks has been continuous almost from the very beginning. Tall timber derricks, many without adequate guy lines, contributed to the hazards of oil production. Fires were frequent on the "hill," due to oil-saturated rig timbers and debris collecting beneath the derrick floors. Crews of rig builders have been constantly busy replacing girts and sway braces and reinforcing decaying derrick legs. Even the modern steel towers, replacing wooden derricks destroyed by fires, require frequent repairs, and these locations consume unproductive time when rigging up for a cleanout or rod-and-tubing job.

When Richfield Oil Corp. took stock of the situation, it realized that sometime down the road all surface equipment would be completely removed from the ground. Since the cost of tearing down derricks and cleaning up a lease is comparatively no more expensive one time than another, the company started a program of modernization.

The program was temporarily halted when supplies became short in the early part of the 1940's, but soon got under way after V-J Day in 1945. All leases, not only on Signal Hill but throughout the Los Angeles basin, were surveyed to determine the most efficient equipment required to pump oil from the wells. Small pumpers producing a minimum amount of water obviously required a lighter pumping unit than a well making several hundred barrels of water per day.

Modernization Thorough

Each well in the planned series of modernization was literally taken apart from the ground up. The old derricks were torn down and disposed of while the ground around the location was graded to a relatively smooth surface. All piers and deep

The "backdrop" of wood and steel derricks adjoining one of Richfield's modernized leases on Signal Hill.

cellars were eliminated. The casing was reset for the casing head to be placed at a standard height for convenience of operation and servicing. A new cellar, shallow and about 3 ft. square, was built with concrete walls. A cement pad was poured around the well. The pad included a cement foundation for the pumping unit which was placed in a position for maximum access to the well and equipment. Casing-head vapor lines—most wells are produced under a vacuum—and piping to carry the oil were installed below ground before the concrete pad was poured.

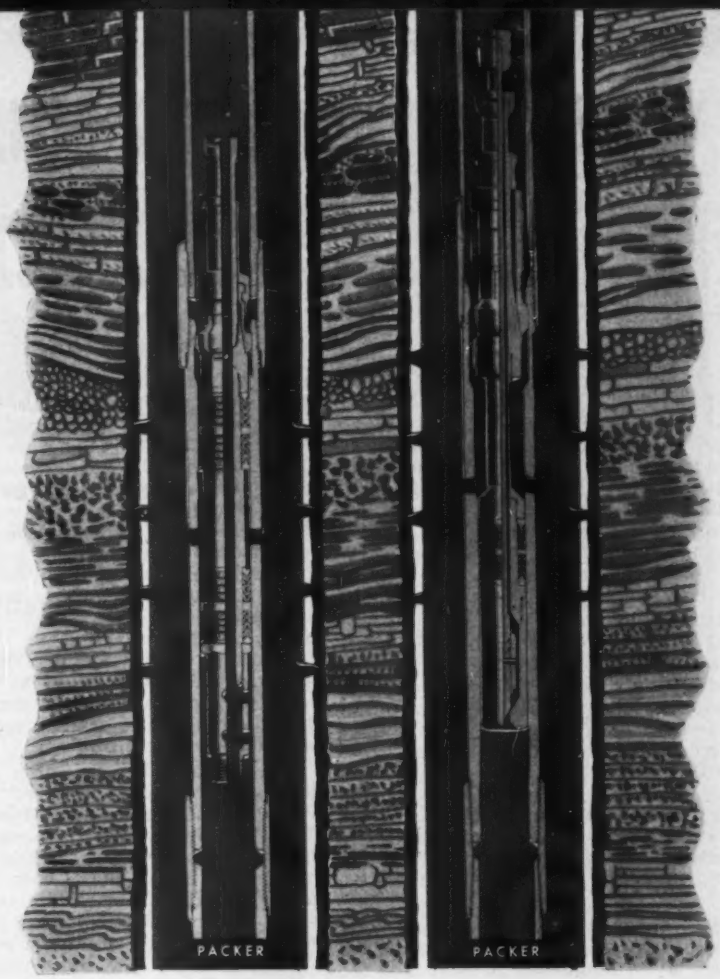
Cost advantages.—The program was set up for a 10-year payout, based on estimated maintenance of old equipment. Obviously, when the old derricks were pulled down, that was an end to rig building and derrick maintenance. Eliminated largely is the ground crew consisting of several men in each gang formerly required to "goose" grass and weeds from the immediate area surrounding the pumping wells. The ground over practically the entire leases was leveled and treated to retard growth of vegetation, or surface treated with a mixture of salvaged tank bottoms and refuse oil.

Time advantages.—When a well requires a pulling job under the new program, a modern mobile service unit is brought to the location, the mast raised and in a short time, the well is back on production. To make the area at each well more helpful to the pulling crew, a concrete pad was poured, integral with the well apron, at the most accessible side of the location, with a distinctive imbedded color stripe as a guide for the driver of the heavy unit. Using this stripe as a guide, the operator can immediately spot the machine at the desired point without making several passes before raising the mast.

Flow tanks and oil-treating equipment have been modernized by replacing outdated equipment with up-to-date welded tanks. B.s. and w. commonly drained by way of an open ditch to an earthen sump is now led to concrete separating pits. The old sumps filled by bulldozers eliminated the familiar "ba'r" pits as a hazard and sometimes a mosquito-breeding rendezvous.

Attractive walls around the tank batteries are made of tile or earth embankments surfaced with street-paving material. Old-style wood steps and handrails have given place to steel and concrete, while small, but adequate, shipping pumps are installed in the place of the older, more hazardous equipment.

Other advantages.—Aside from the saving of time, equipment, and "unnecessary" rig-building labor, the company has realized a material benefit from the program in lowered insurance rates. Last, but not least, is the attractive appearance of the leases.



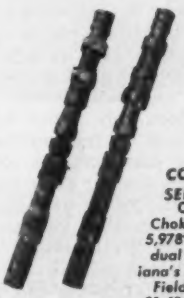
Duet for Dual Completions

OTIS *Removable* SIDE-DOOR CHOKE

OTIS *Removable* SEPARATION TOOL

More than 20 two-zone completion and production operations are practicable and economical with these basic tools and supplementary Otis Sub-Surface Controls. For example, an Otis Removable Side-Door Choke *(left)*, run in on a wire line under pressure and seated in a Landing Nipple made up in the tubing above the packer separating the two formations, allows the lower zone *(red)* to flow through the tubing, and the upper formation *(blue)* to be produced through the casing. An Otis Removable Separation Tool, *right*, blanks off the lower pay so that the upper zone, admitted through ports in the Nipple, can be produced through the tubing, or to allow acidizing operations, etc., for the upper zone only. Ask an Otis engineer near you for illustrated literature and details on these and the other Otis two-zone production tools. Otis Pressure Control, Inc., Box 7206, TWX DL-220, Dallas.

Houston, Corpus Christi, Victoria, Falfurrias, Longview, Odessa, Oklahoma City, Houma, New Iberia, and Brookhaven



10 YEARS' CONTINUOUS SERVICE for an Otis Side-Door Choke pulled from 5,978' in a flowing dual well in Louisiana's Anse La Butte Field, needed only $1.60 worth of new cups to restore it to original condition—ready to be re-run. Installation of this 2" Type G was in 1941. (Today's Side-Door Chokes are identified as Types F and L.)

Otis—outstanding in the Industry for pressure control

ROTARY DRILLING EQUIPMENT—1951

It has come a long way since Captain Lucas' rig that brought in famed Spindletop discovery 50 years ago

by M. F. Hazel*

JANUARY 10, 1951, marked the fiftieth anniversary of the discovery of oil at Spindletop, 3 miles south of Beaumont. Few events have had such a far-reaching effect on this great industry. Before 1901 oil production in this country had been of modest proportions, geared to the needs of the lamp and buggy days.

The Spindletop gusher shooting oil 200 ft. into the air ushered in an era of frenzied oil exploration and drilling throughout the Southwest. At the same time a new era in rotary drilling was begun and today, although the pieces of equipment are vastly different, the method of rotating the drill pipe and bit is the same today as it was 50 years ago when Lucas drilled to a depth of 1,100 ft. in 72 days. This same rotary method today with a modern rig would drill a 1,100-ft. Spindletop well in 6 to 7 hours.

The rig Captain Lucas used on the discovery well at Spindletop had two advantages over the rigs of today. It was a lot lighter in weight and a lot cheaper to buy. Its capacity to drill, however, was also in proportion to its weight and cost. The steam engine was a single-cylinder 9 by 12-in. 25-hp. job. The draw works was a single-speed model with one brake flange and no brake lining. The rotary was the well-remembered open-type grip ring. The swivel had exposed bearings and they had one large 30-hp. boiler to supply steam for the rig.

Rotary Design in Late 1920's

The turn of the century is notable not only because of the Lucas discovery but it also marked the beginning of practical rotary drilling. The development of this new method of drilling for oil did not progress as fast as one might think—15 years after Spindletop, only about 1 in 10 holes was drilled by this method. Actually until the late twenties (or about the time of Seminole) there was little real change in rotary-drilling machinery except that the various pieces of equipment were made larger and would therefore drill deeper. During this period probably the most important changes or developments were the twin-cylinder steam engines to replace the single-cylinder; the introduction of kellies and drive bushings to replace the grip ring; and two and three-speed draw works with two brake drums to replace the single-speed, single-brake type.

Early 1930's.—Setting down in chronological order the development of the modern rotary rig, piece by piece, would certainly make interesting reading and no doubt some day someone will attempt to do just this. Probably the most important development in the early thirties was the unitizing of the draw works. A few rigs in East Texas and in Conroe field north of Houston in 1932 had standard jack-post draw works which had been unitized in field shops so that they could be transported and set up as complete units.

For a number of years after introduction of the first unitized draw works, manufacturers, as well as field shops, did little more than weld a jack-post draw works together and enclose the chains of oil-bath housings. Then about the middle thirties we saw the introduction of the power rig, which has all but replaced the steam rig in its few short years of existence. This is probably the most important of the major changes that have taken place in rotary drilling since its inception.

Other Important Developments

Some of the other important developments can be listed as follows:

1. Jack-knife or portable derricks.
2. Design of more compact units for easier moving and faster assembly.
3. Rotary-drilling units.
4. Power rotary and casing slips.
5. Air operation of drilling rigs: This would include air clutches, air throttles for engines, air-operated mechanical clutches, and air brakes.
6. Fluid drives for rigs: This includes both torque converters and fluid couplings.
7. Hydraulic and electric auxiliary brakes.
8. Drilling-weight controls.

Today a very modern power rig often includes all of these improvements, especially if it is a rig for drilling in the range of 6,000 to 10,000 ft. Rigs for drilling beyond this depth have not gone to the portable derrick to any great extent because these larger rigs have fewer moves for any given length of time, which means that the cost of erecting the derrick is not as much a factor as on smaller rigs. Portable derricks generally do not have the floor space of a standard derrick, and this has also tended to lessen their demand for deeper drilling. This does not mean that the portable mast cannot be designed so as to have ample floor space, even for the largest rigs; however, when this space is provided, it means a heavier derrick with more sections, in order to reduce it when disassembled, to the 8-ft. road limit.

Space does not permit a discussion of all the items used on a modern power rig today; therefore, most of this discussion will be confined to the draw works and drive which we all think of as the heart of a drilling rig. The earliest power rigs were for the most part steam draw works with reverse clutches added. It is difficult to find any part of the latest draw works that has not undergone almost complete revision since that time.

Precision roller chains have replaced the A.P.I. chains used on steam draw works. The chain sprockets are accurately machined with the same type of equipment used to cut precision gears. Most manufacturers surface harden their sprockets after cutting to assure long life.

Air clutches are almost universally used and most manufacturers on their larger draw works now use a large air clutch on both the high and low-speed side of the drum. This is a more expensive installation than the higher-speed clutches on the intermediate shafts; however, there appears to be enough advantages in favor of the clutches on the drum shaft to warrant this expense. A closed cooling system on the brake drums is almost universally used—jack posts are a thing of the past—the draw-works side plates are made sufficiently heavy so they can be bored to receive the shaft bearings.

Multispeed Draw Works

Most draw works now have six speeds forward, a reverse, and three or more rotary speeds. The arrangement of clutches, sprockets, reverse, etc., varies with each manufacturer; however, in general the modern draw works has a range of speed ratios which gives a high line speed for raising the empty blocks of around 3,000 ft. per minute, and a maximum line pull for any drilling or pulling condition encountered at the maximum depth rating of the rig—low-low generally gives a top line

*Director of engineering, Oil Well Supply Co., Dallas.

Stabilize YOUR DRILL STRING

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- **MAKE FULL GAGE HOLE**
- **ELIMINATE BIT WOBBLE**

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- **111 per cent stronger.**
- **Heavy ribs between cutters give maximum strength in torque and bending.**
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speed at drum of about 300 ft. per minute.

Compounds for draw works must necessarily be very flexible because of the variety of engines available today. Many manufacturers are now building their compounds similar to the draw works in that they are using heavy plates for the frame, which is bored to receive the shaft bearings. Engine skids are generally designed so that a subskid or base is required in order to raise the engine to the necessary height for proper alignment with the compound shaft. This means that only the subskid need be changed to accommodate different makes of engines, either gas or diesel; and should an engine require repairs during the drilling of the well, it is easily handled on the subskids and no other part of the compound is disturbed.

Torque Converters

Torque converters are increasing in popularity on smaller rigs; however, torque converters and fluid couplings, generally of the scoop type, are being used on larger rigs by several operators. It is believed that the torque converter will continue to gain in popularity because it has the operating characteristics which are needed for hoisting. Its relative inefficiency and high cost have been the chief retardants to date.

Manufacturers of power pumps were greatly concerned when torque converters first began to be used on the rig compounds. The reader can readily understand this, for the average torque converter will build up torque to an approximate 4:1 ratio. This means that if the engines driving the power pump have a horsepower output equal to the input rating of the pump, and a bit should plug, or for any reason circulation could not be obtained **unless the relief valve operates**—we would build up pressure four times as great as the rating of the pump. In addition, the pump horsepower is generally more than matched by engine horsepower from the compound. The fact is, however, that very little trouble has been experienced — probably because operators who use torque converters have watched pump pressures in relation to liner size and have been sure that the relief valve was working properly. Under these conditions the maintenance of a pump will no doubt be even less with torque converter than with a straight mechanical drive, because the cushion of a fluid drive has been added to absorb shock loads.

Fluid couplings have the advantage when used on a compound of not building up torque, which reduces the likelihood of overloading the pump; however, they do not have the characteristics which are so desirable in a torque converter when the engines are used for hoisting. This fact, plus their cost, has resulted in their limited use to date.

A piece of equipment used in connection with the draw works which has become popular in the last few years, but has been on the market for several years, is the automatic drilling control. When reviewing the patent files on drilling controls, it is evident that long ago men recognized the need for some type of feedoff which would do away with the standard method of feeding with a hand brake; and it is surprising that as simple as some of these feedoff devices are, they did not become popular years ago. It is probably due to the fact that their actual efficiency was a long time being recognized and that this is another piece of equipment that is not essential to the actual drilling of the well, and therefore, is not included in the original rig purchase in an effort to keep the price to a minimum. An electric rig in the late twenties used the Westinghouse-Hild drive which incorporated a drilling control. It is interesting to note that Frederick W. Hild made his original application for an automatic weight-control device as early as February 2, 1921. A part of this patent application reads as follows:

"It is an object of the present invention to provide means for supporting the weight of a drill tool of the machine of the above described character (this was described as a rotary drilling machine for sinking wells), by a body of fluid under pressure, and a further object is to employ variations in said pressure, due to changes in the weight of the tool or to a varying resistance to the operative movement of the same, to indicate, to record, if necessary, the conditions under which the drill tool is operating and to automatically regulate the feeding movement of the tool proportionate to changes in its weight and to variations in the resistance it encounters."

Brantly's Patent

Following this original patent of Hild's, J. E. Brantly on January 5, 1929, made patent application for a drilling control. The first part of this application reads as follows:

"My invention relates to a method of apparatus for feed control and more particularly to a hydraulic feed control for rotary drilling or boring apparatus, such as utilized in drilling oil, gas, or water wells in the earth. In accordance with my invention, a control is effected in response to increase beyond a predetermined value in pressure on the drilling bit, independently of the torque on the drill pipe, whereby descent of the drill is halted until the pressure on the bit has decreased to within its normal range, and further, the rate of feed of the drill is continuous during normal pressure on the bit and is independent of the torque on or exerted by the drill pipe."

Although men have recognized the advantage of some means of controlling the rate of feed of the drill pipe, it was not until the last few years that these devices have become quite popular. The hydraulic feed control for which Hild and Brantly each hold certain patents is not in itself a complicated device. Briefly, it operates by using the torque, or turning effort, on the drum shaft which results from the drilling-line tension as a source of power to drive a multiple-cylinder pump through a geared speed multiplier. With this arrangement, even though the rate of drilling is exceedingly slow, the pump speed is sufficiently high to give satisfactory rates of fluid discharge. By controlling the discharge from the pump the rate at which the drill pipe can feed is controlled.

Two Types of Regulators

Two types of regulators are available for governing the feedoff:

1. A manifold made up of a series of needle valves located at the driller's position. These valves vary in size so that the driller can manually allow a large volume or a very minute amount of fluid to pass through the manifold. This method of control gives a constant rate of feed which means that the driller must check his weight indicator from time to time to see that he is carrying the correct amount of weight on his bit.

2. The automatic control is designed to carry a predetermined weight on the bit no matter what type of formations are encountered. The automatic control is operated from weight indicator diaphragm located on the deadline in the same manner as the one used for a weight indicator. The fluid pressure built up by the diaphragm is connected to a bourdon tube in a regulating valve. As the fluid pressure changes due to an increase or decrease in the load on the deadline, the regulating valve will react to permit high pressure air or gas, depending on which is available on a particular rig, to pass into and actuate a motor valve.

This motor valve is connected in the circulation system of the feed control pump and, therefore, regulates the amount of fluid that can be pumped, which in turn regulates the feedoff of the drum. Many operators who have automatic feed controls tell of phenomenal results, both in the saving of time and the reduction of the number of bits. It is certainly logical to assume that the uninterrupted and untiring automatic control will give a better performance than a driller can possibly do by feeding with a standard brake while attending to his many other duties around a rig. Where a very accurate weight control is required, such as coring with diamond core barrels, the automatic drilling control is a real necessity.

The modern rotary rig has come a long way since the early days of Spindletop. However, if there is an anniversary celebration after another 50 years of progress and the modern rig of the day is set up beside our now modern rig, those that will attend will no doubt find our air-operated torque converter rigs of today just as obsolete as we find the rig Captain Lucas used to drill the well that was heard around the world.

Two Reaction Chambers

(Continued from page 94)

Cracked gasoline, as pressure distillate, is run to a receiver from which gases are taken and passed through an absorber. The 3 by 30-ft. stabilizer column is operated with a bottom temperature of 355° F. and the overhead released at 124° F. Bottoms are transferred to a 3 by 25-ft. debutanizer, operated with a bottom temperature of 325° F. and a top of 130° F. Bottoms are pumped directly to a tubular heater where the temperature is increased to 475° F. for introduction into an 8 by 56-ft. clay-contact chamber, containing 28 tons of California Muroc clay.

Flow through the clay-contact chamber is from top to base where the outlet temperature is held at 460° F. Flowing to a 4 by 56-ft. rerun column, the cracked gasoline is fractionated with the overhead passing to a rerun-afterfractionator to obtain two streams of pressure distillate.

Blending operations are more flexible when two grades of cracked gasoline are produced, than if one long cut of pressure distillate is manufactured. Several different types of motor fuel are possible when completing a batch with natural gasoline, straightrun, and the grade of pressure distillate required.

By the use of two reaction chambers, the combined heavy and light charge processed through two heaters, it is possible to maintain high temperature through both chambers. Consequently, the charge is subjected to greater time-temperature action than can be achieved with a single reaction chamber. At least one result is reflected in a higher rate of cracking charge.

Approximately 25 per cent increase in throughput has been obtained since the second chamber was put into operation. This additional cracking capacity has been obtained without altering the design of either furnace.

Water Injection Boosts

(Continued from page 97)

1. 12 million barrels of oil by natural depletion,
2. 24 million barrels of oil by gas repressuring, and
3. 30,185,000 bbl. of oil by water flooding.

Since water-flood recovery was substantially greater than the other methods considered it was unanimously selected by all interested parties. Unitization of the various leasehold interests became effective July 1, 1948, by order of the Arkansas Oil and Gas Commission upon request of 100 per cent of the owners of working interest and 77 per cent of the royalty owners.

Reservoir pressure up. — Construction of the various facilities necessary to carry out the planned program was completed during the 18 months following unitization and during the past few months the unit has assumed normal operation. The lowest bottom-hole pressure was recorded as 412 psi. in January 1949, at which time the accumulated recovery was 2,701,537 bbl. of oil. Bottom-hole pressure was increased to 1,183 psi. on February 1, 1951, by the injection of 8,002,941 bbl. of water into the reservoir despite the continued allowable oil production. The accumulated oil recovery amounts to 6,950,886 bbl.

Many tangible benefits already apparent from the water-flood program include substantial increases in the potential production for many of the wells, together with the fact that the allowable production is more easily obtained now than a year ago. Fourteen unit wells have now returned to a flowing status. Another inherent benefit to the operators is lower operating cost. Assuming that the estimated recovery values are correct, the additional 18,000,000 bbl. of oil to be produced by water-flood operation (above natural depletion recovery) will provide added revenue (based on present price) in the amount of $44,500,000.

Allowables raised.—The many advantages of water flooding the Wesson Hogg sand reservoir have been amply demonstrated even though the program has been under way less than 2½ years. In recognition of the benefits of the reservoir under the water injection program two increases in allowable, totaling 1,503 bbl. of oil per day, have been granted by the Arkansas Oil and Gas Commission, and the unit today has requested an additional 10 per cent increase.

Pipe-to-Soil Potentials

(Continued from page 95)

through the three points will be a reasonably reliable representation of the actual potential throughout.

Two factors may interfere with the accuracy of the above technique: (1) a serious departure from uniformity in the pipe coating, such as is produced by a large bare short-circuited casing, and (2) the variations in the normal potential of the line without cathodic protection. These variations are less severe than the variations in the corroding potential of the line, however, and are not often large enough to cause concern. As for the casings and sections known or suspected to be markedly different, the only safe method is that of taking potentials near such sections and treating them separately.

The catenary through three points thus obtained may be approximated with an accuracy sufficient for this type of work by actually suspending a small flexible chain, such as might be used on a pendant, upon the vertical surface of the profile, and marking a few points through which a smooth curve may then be drawn.

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...an aggregate to lighten your cement slurries

More and more oil men are discovering that cement slurries made with Strata-Crete give them these four valuable benefits — at low cost.

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Strata-Seal

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to combat lost circulation of drilling mud

Recently made available to the oil industry, Strata-Seal has already proved to be one of the most highly effective, *practical* developments to combat lost circulation and returns.

So effective is Strata-Seal's bridging action, that even in a number of extreme cases, it has restored circulation and saved abandonment of wells.

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1. Strata-Seal protects investments by making possible reclamation of wells about to be abandoned.
2. Eliminates or reduces rig down time.
3. Savings resulting from ability to screen.
4. Has no detrimental effect on viscosity, water content and gel strength of drilling fluid.
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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Residual Fuel-Oil Purchasing

In reviewing our fuel-oil purchasing policy, what are the significant product characteristics, fuel-price movements, industry practice regarding the timing of purchases, etc.? Can you direct us to discussions of those subjects?—H. G. C.

These somewhat specific questions are probably not directly answered in the current literature although some of the references listed below may lead to conclusions.

With regard to residual fuel oil there are not many significant specifications, tests or properties:

1. **Gravity.**—The lower the gravity the greater the heating value of a volume of material or of storage capacity. This is important with respect to railroad and marine fuels. However, at 10° A.P.I. gravity (1.0° specific gravity), the oil weighs the same as water and hence mechanical emulsions fail to settle or separate, nor can the fuel oil be displaced with water. Some purchasers ask for 8° A.P.I. fuel oil or lower because of the greater heating value. However, the low-gravity fuels are usually more viscous.

2. **Viscosity.**—This is, of course, vital with respect to handling, pumping, and atomizing. Residual fuel oil usually must be heated. The temperatures required are shown in detail in Petroleum Refinery Engineering, third edition, page 66 (McGraw-Hill Book Co., Inc., New York, 1949) and may be summarized as:

Furol viscosity at 122° F.	Firing temperature (°F.) Mechanical burners	Steam burners
30	130-182	97-130
60	161-216	123-161
120	184-239	145-184
200	200-254	160-200
300	210-265	170-210

Viscosity may vary widely between shipments and hence it behooves the purchaser to establish a procedure by which the temperature can be adjusted for each shipment. In this way the fireman can operate the burners at a uniform and maximum efficiency.

3. **B.s. and w.**—Obviously this should be as low as possible (at least under 2.0) because a high value contributes to plugging of screens and burners, and requires cleaning of the tanks at more frequent intervals. Various "dopes" are said to alleviate or eliminate these difficulties but the true extent of their usefulness has not been established.

4. **Ash.**—A high content of ash or of the lime or soda that is widely used in the manufacture of cracked fuel oil may flux with the furnace walls or be deposited as a dust on boiler tubes. Recently, it has been learned that small amounts of the elements vanadium, nickel, etc., in the ash may be deleterious in some services. Nickel is particularly troublesome in spoiling the catalyst used in fluid catalytic cracking, and vanadium appears to quickly destroy high-temperature chromium-steel tubes.

5. **Sulfur.**—Large amounts can usually be tolerated. However, it contributes to the corrosion of steel stacks if the stack temperature is low, as during the winter, and of course sulfur is troublesome in most ore-reducing or metallurgical operations.

Additional references (1-8) are listed below.

For many years gasoline was the largest refinery demand and the demand occurred in the summer. This forced an accumulation of residual fuel oil during the summer. However, the situation is not now clear because a large demand for distilled or domestic furnace distillate during the winter has been developing.

Not Transported by Pipe Line

Residual fuel oil is not transported by pipe line because of its high viscosity. This is difficult for certain isolated refiners and tends to lead to a larger variation in prices than the variations encountered with most other products. The isolated refiners try in every way to dispose of their fuel oil in the immediate vicinity, and they are inordinately ready to sign long contracts. Thus, freight rates are significant in establishing the price of residual fuel oil.

Coal is the major competitor of residual fuel oil. This influence is found everywhere even though coal may not be readily available at all points. Its influence on the price of fuel oil arises mainly from competition on the East Coast of the United States where large power installations have both coal and oil readily at hand. The fuel oil is supplied mainly from the large Caribbean refineries which operate on low-gravity Venezuelan crude oils. The influence is not strongly felt on the Pacific Coast because of the great distance from the Caribbean and because many California oils are also of low gravity. Natural gas is not much of a competitor of residual fuel oil, except in the Southwest. The shale-oil processes that are being developed now produce large amounts of fuel oil. This will tend to stabilize the market, but it will probably not tend to decrease fuel-oil prices because the shale-oil operators must receive a good price for fuel oil because it is a major product.

The relatively large amount of residual fuel oil produced from such low-gravity crude oils (13° to 22° A.P.I. gravity) as those found in California and Venezuela, tends to tie the price of residual to the price of low-gravity crude oil. In California, a fairly consistent pattern or procedure has been established. The price of 14°-14.9° A.P.I. gravity Wilmington and Kern, California, crude oils including transportation charges has been, since 1943, almost exactly equal to Bunker C prices at San Pedro. The posted prices of lighter crude oils (14° to 25° A.P.I.) indicate that the price for Bunker C fuel is about the same as the posted price of 13°-16°-gravity crude oil, and that the posted prices of these lighter crude oils increases by nearly a uniform amount per degree A.P.I. to gravities of 20° to 27° A.P.I. where the posted price becomes coincident with the 2-cent-differential schedule that is used for the regular light crude oils of 25° to 40° A.P.I. gravity. The break point at 20° to 27° A.P.I. appears to be related to the posted price of gasoline. Thus, if the gasoline price is high, the break point occurs at low gravities and vice versa.

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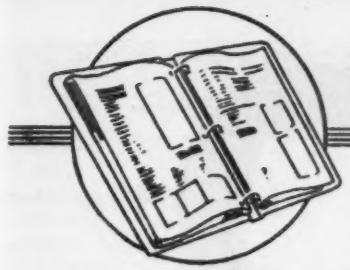


THE REFINER'S notebook

No. 62

Mechanical Stability of Greases*

THE mechanical stability of a grease is a comparative measure of its ability to resist breakdown of its semisolid consistency under prolonged mechanical working. The degree to which a grease may be mechanically stable depends to a large extent on the physical structure of the fibrous soap lattice. The fibers may vary in length, strength, and thickness, in degree of distribution, and in their ability to reform a lattice-like structure when shearing ceases. These characteristics are dependent on the kinds and percentages of soap and petroleum oil used, variations in methods of manufacture, conditions of temperature, oxidation, etc., under which the grease operates.

The mechanical stability of greases varies from type to type and with the conditions of working. A grease receives extreme working in the Shell Roll test, for example, which is designed to simulate the extreme conditions resulting from certain types of mechanical design and operation. Under such extreme working even the "most stable" grease will eventually break down—that is to say, will have its soap-lattice structure destroyed so that the mixture liquefies.

Directional fluidity.—The characteristic directional fluidity of greases as noted previously in this series is, perhaps, their most valuable capability from the standpoint of performance. According to the theory of "directional fluidity," the shearing force acts only in the direction of bearing motion. Thus the grease is sheared into layers that slide over each other.

Stability, good and poor.—In a grease having good mechanical stability, one may visualize fibers in the soap lattice as remaining undisturbed except at the lines of shear. It may also be assumed that when shearing ceases the fibers reform the lattice across the lines of shear. Thus the grease stays in the bearing. In a grease having poor mechanical stability, one may assume that the breaking of the fibers by the shearing forces results in the progressive destruction of the soap structure within the layers. Thus the mass becomes a fluid mixture of soap and oil which flows out.

Fig. 3—Visualizing what takes place when bearing motion stops. Sheared layers reform across lines of shear as motion stops if mechanical stability is good, but do not reform if mechanical stability is poor.

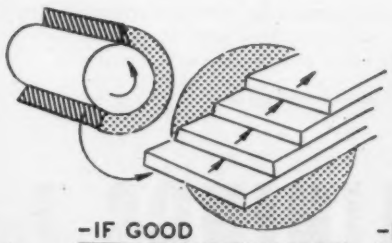
When bearing motion stops, if mechanical stability is good, one can visualize the soap fibers within the sheared layers as reforming the lattice across the lines of shear when motion stops. Thus the grease again becomes a semisolid mass. If mechanical stability is poor, the fibrous structure within the layers breaks up and lacks the ability to reform. Thus the mass will not again become a semisolid.

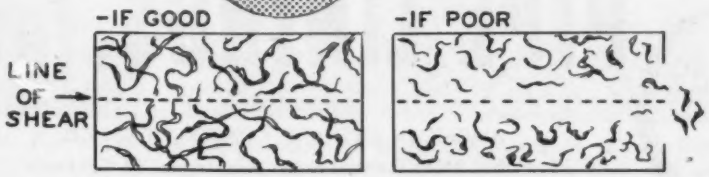
The mechanical stability of a given grease under operating conditions is very difficult to evaluate in laboratory tests. Although the softening in consistency of a "worked sample" is sometimes taken as a measure of stability, this does not necessarily indicate how the product will "stand up" in a bearing. Often a grease that "works down" considerably under laboratory tests will remain in a bearing and perform its lubricating function, while one that shows a lesser degree of softening will fail. Actual use under working conditions is, so far, the only real measure of mechanical stability.

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."

Fig. 1 (Right)—Crease structure with long and with short fibers is shown. Both may be mechanically stable.

Fig. 2 (Below)—Visualizing mechanical stability under working conditions in a bearing. Shearing force acts in direction of bearing motion. Grease is sheared into layers sliding over each other. Good mechanical stability means fibers are broken only at lines of shear. Poor mechanical stability denotes progressive destruction of soap structure within layers.





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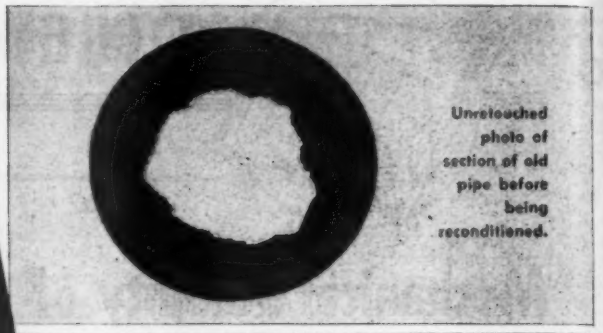
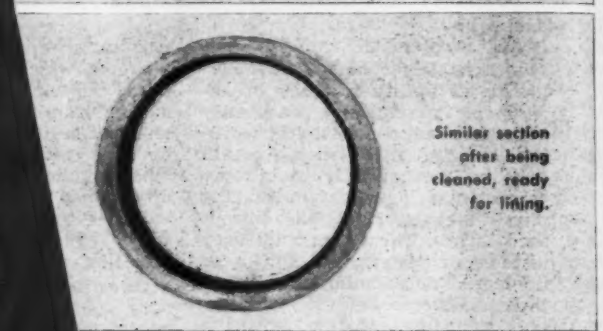


Unretouched photo of section of old pipe before being reconditioned.



Similar section after being cleaned, ready for lining.

Typical section after being cement-mortar lined by the Tate process.

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PIPE LINES

Expansion Planned

Northern Natural maps $60,000,000 program

WASHINGTON.—Northern Natural Gas Co. laid plans for a $60,000,000 pipe-line-expansion program before the Federal Power Commission last week for that body's approval.

The program would involve the laying of 580 miles of pipe in Kansas, Oklahoma, Texas, and Nebraska and the installation of 100,000 hp. in additional compressor units, according to J. T. Innis, vice president of the company. The new facilities would increase Northern Natural's present capacity of 600,000,000 cu. ft. per day to 825,000,000 cu. ft.

The company plans to build its lines in steps, delivering first 650,000,000 cu. ft. daily and increasing it gradually up to the full 825,000,000.

Contracts for laying 370 miles of 4 to 26-in. line will be let in March and April for segments of the Hugoton field gathering system. FPC authorization will not be required for this gathering-line work. In addition, two new dehydration plants have been contracted—one at Skellytown, Tex., contracted to Dresser Engineering Co., and the other at Hugoton, Kans., contracted to J. F. Pritchard & Co.

Additions and changes are to be made at dehydration plants at Holcomb and Sublette, Kans., and a new light-stripper natural-gasoline plant will be installed at Holcomb Station near Garden City, Kans.

Bids will be invited later, subject to FPC approval, for laying 210 miles of 26-in. line on five loops—one in the Texas-Oklahoma area, two in Nebraska, and two in Kansas. Pipe has been received for all but 100 miles of these lines.

The additional 100,000 hp. in compressor units will be installed on the main line and gathering systems. A new station equipped with vertical engines will be built near Burdett, Kans. Two new gathering stations to be built in Hugoton field also will be equipped with vertical units. The remaining units, of the horizontal type, will be installed at existing stations.

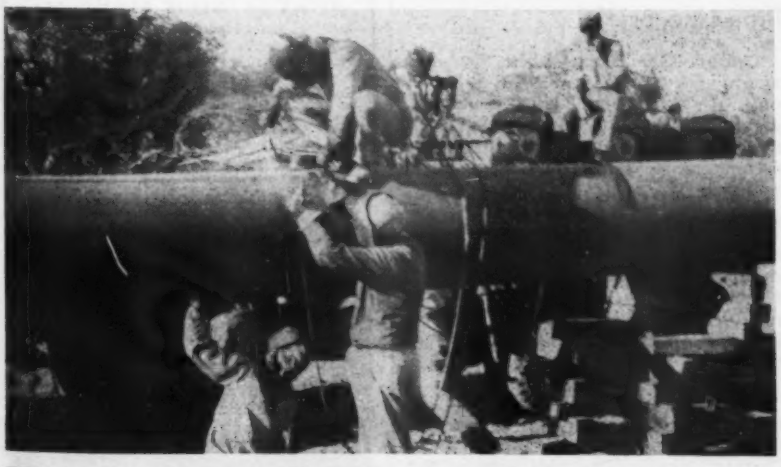
Bayou Interest Purchased

HOUSTON. — Ownership interests in Bayou Pipe Line System were revised last week through purchase from Humble Pipe Line Co. of its entire interest in the system by the remaining five pipe-line companies, T. E. Swigart, president of Shell Pipe Line Corp., has announced.

The five companies now participating in the operation of the system are Shell Pipe Line, Fairfax Pipe Line Co., Crown Central Pipe Line & Transportation Corp., Pure Transportation Co., and Atlantic Pipe Line Co.

The Bayou system is a refined-products pipe line which connects refineries of the various companies at Pasadena, Deer Park, Texas City, Smith's Bluff, and Atreco, Tex., with the initial station of Plantation Pipe Line Co. near Baton Rouge, and with the river terminal of Pure Oil Co. at Port Allen, La.

Revised-ownership interests in Bayou's Segment 1, Baytown to Neches, Tex., with an estimated total capacity of 52.000 bbl. daily, are as



SPEEDUP.—Four stringer-bead welders instead of the usual two are shown at work with Western Construction Co.'s pipe gang which is now engaged in laying 26-in. pipe on the section of Texas Gulf Coast-to-Joliet, Ill., line between Hungerford and Refugio, Tex., for Texas-Illinois Natural Gas Co.

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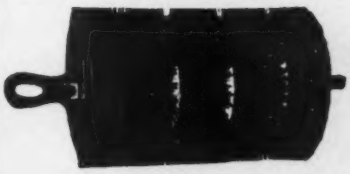

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follows: Shell, 47.91 per cent; Fairfax, 31.26 per cent; Crown, 12.03 per cent; Pure, 6.12 per cent; and Atlantic, 2.68 per cent.

In Segment 2, Neches to Baton Rouge, estimated total capacity, 52,000 bbl. daily, new interests are: Shell, 39.47 per cent; Fairfax, 21.85 per cent; Crown, 8.40 per cent; Pure, 21.06 per cent; and Atlantic, 9.22 per cent.

Kansas-Nebraska to Expand

WASHINGTON.—Kansas-Nebraska Natural Gas Co., of Phillipsburg, Kans., has been authorized by the Federal Power Commission to build 515 miles of pipe lines and install 5,570 hp. in new compression facilities in Kansas and Nebraska.

Cost of the project is estimated at $5,210,266. The new construction will provide additional capacity for the company to meet increased demands of existing markets and to serve new markets in north-central Nebraska.

Of the 515 miles of lines, 73.5 miles will replace existing lines of smaller-diameter pipe. The various sections of pipe which are to be replaced will be removed and salvaged.

The newly authorized facilities will include three new compressor stations at Holcomb and Albion, Kans., and Grand Island, Neb., which will total 3,570 hp. An additional 2,000 hp. will be installed at the company's Palco, Kans., compressor station, and more cooling equipment at its Scott City, Kans., station. A dehydration plant with a capacity of 44,000,000 cu. ft. will be constructed at the Holcomb compressor station.

In all, 37 Nebraska towns will be served through the addition of the new facilities—27 of them at retail by Kansas-Nebraska, and 10 more at wholesale through deliveries to Central Electric & Gas Co.

Pipe-Line Briefs

United Gas Pipe Line Co. has awarded contract for 1,000 miles of natural-gas line in Texas, Louisiana, and Mississippi to Brown & Root, Inc., Houston. Cost of the project is estimated at $111,000,000. *(See news section.)*

Texas Eastern Transmission Co. will start work immediately on its 791-mile, 30-in. natural-gas line from Kosciusko, Miss., to Connellsville, Pa., newly authorized by the Federal Power Commission. *(See news section.)*

Humble Pipe Line Co. has placed in operation a 9-mile, 8-in. crude line to serve Pewitt Ranch field in Titus County, Texas. The new line is the first pipe-line outlet for the field. It is said to be handling 3,000 bbl. per day.

(More pipe-line news on page 117)

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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Phillips Pipe Line Co.—35 miles, 10-in.; authorized; Brownfield, Tex., to Plains, Tex.

Phillips Petroleum Co.—278 miles, 10-in., under way, Borger, Tex., to Yale, Okla.; Brown-Lite Co., Tulsa, and Arey-Phillips Construction Co., Pampa, Tex., contractors.

Phillips Pipe Line Co.—53 miles, 8-6-in., under way, Wheeler to Sweeny, Tex.; O. R. Burden Construction Co.

Phillips Pipe Line Co.—24 miles, 8-in., under way, Thrall to Kansas City, Kans.; C. H. Gragg Construction Co.

Platte Pipe Line Co.—1,075 miles, 16-20-in., contracted, Worland, Wyo., to Wood River refining area in Illinois. Contracted as follows: 552 miles, Chatham, Wyo., to Holdredge, Neb., R. H. Fulton & Co., (Sections 1, 2, 3, and 4—section 1, 126 mi., of 16-in.—remainder 20-in.); 149 miles, 20-in., Holdredge, Neb., to Nebraska-Kansas line, Bishop & Lock, (Section 5); 100 miles, 20-in., northern edge of Kansas, Rumsey Brothers, (Section 6); 274 miles, 20-in., State of Missouri, O. R. Burden, (Sections 7 and 8).

Sinclair Pipe Line Co.—700 miles, 22-in., planned; Drumright, Okla., to Chicago.

Texas Pipe Line Co.—56 miles, 12¾-in., Chico to Wichita Falls, Tex.; R. H. Fulton & Co., contractor; M. L. Boyd, spreadman, Henrietta, Tex.

West Coast Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

West Texas Gulf Pipe Line Corp.—450 miles 24 and 26-in., authorized, West Texas to Gulf Coast.

Products Pipe Lines

Buckeye Pipe Line Co.—400 miles, 8 to 14-in., under way, New York, New Jersey, Philadelphia.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City Iowa, to Sioux Falls, S. D.

Great Lakes Pipe Line Co.—119 miles, 8-in.; planned; Des Moines to Iowa City.

Miami-Valley Corps.—58 miles, 8-in., under way, Dayton to Cincinnati, Ohio; Anderson Brothers Co.

Plantation Pipe Line Co.—707 miles, 14 and 18-in., contracted, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. Baton Rouge, David R. Williams, Jr., project manager, George Allen, general superintendent, O. L. Martin, spread superintendent, Tuscaloosa, Ala.; T. E. Davis, spread superintendent, Talledega, Ala.

Pure Transportation Co.—100 miles, 6-in., under way, Heath to Dayton, Ohio; Wabash Construction Co.

Standard Oil Co. (Ind.).—50 miles, 8-in., under way, north of Sugar Creek, Mo., refinery; Lawhon Construction Co., Southern Mill & Mfg. Co., contractors.

Standard Oil Co. (Ind.).—144 miles, 8-in., authorized, Neodesha, Kans., to Sugar Creek, Mo.

Texas Pipe Line Co.—56 miles, 10 in., under way, Lawrenceville, Ill., to Mt. Vernon, Ind.; O. R. Burden Construction Corp., contractor; O. P. Hines, spreadman; Mt. Carmel, Ill., field office.

Triangle Pipe Line Co.—100 miles, 10-in. planned, Eldorado, Ark., to point on Mississippi River.

Tuscarora Oil Co., Ltd.—27 miles, 8-in., contracted, Pittsburgh Junction, Pa.; to Midland, Pa.; 34 miles, 10-in., contracted, Knappenberger Scraper Trap to Pittsburg Junction, Pa.; 26 miles, 10-in., contracted, Barneytown Scraper Trap to East Freedom, Pa.; Pipe line Construction & Drilling Co.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—276 miles, proposed, Lambertville, N. J., to Boston area; 492 miles, proposed, laterals-New England area.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.).—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Cities Service Gas Co.—40 miles, 4-10 in., Kansas, field office, Liberal; Pat Gilmore, spreadman; Knupp Construction Co., Inc., contractor.

Cities Service Gas Co.—56 miles, planned, Sedgwick, Harvey, and Labette counties, Kansas.

City of Florence, Ala.—84 miles, 1 to 8-in., under way, Alabama, Modern Welding Co., Inc., contractor.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned, Coast and Valley region, California.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado Interstate Gas Co.—215 miles, 20-in., planned, Texas Panhandle to Colorado.

Commonwealth Natural Gas Corp.—69 miles, 12¾-in., under way, Petersburg, to Norfolk, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—14 miles, 8-in., under way, Suffolk to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—10 miles, contracted, laterals—Richmond, Suffolk, and Portsmouth, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—99 miles, 18-in., under way, Stanardsville to near Petersburg, Va.; Ray L. Smith & Son, contractor, Don C. Smith, Orange, Va., spreadman.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—41 miles, 12-in., planned, Enid to Blackwell, Okla., Marlow to Cement, Okla.

Egyptian Natural Gas Co.—80 miles, 6-8-in., authorized, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—470 miles, 24-in., under way, San Juan basin, New Mexico, to Franconia, Ariz.

Kansas-Nebraska Natural Gas Co., Inc.—22 miles, 12-in., planned, Holcomb to Scott City, Kans.; 12 miles, 12-in., planned, Blakeeney to Palco, Kans.; 34 miles, 12-in., planned, Palco to Phillipsburg, Kans.; 10 miles, 12-in., planned, Alma to Holdredge, Neb. (replacement lines). 59 miles, 8 and 10-in., planned, Grand Island to Albion, Neb.; 40 miles, 6-in., planned, Albion to Norfolk, Neb., 27 miles, 6-in., planned, Albion to Neligh, Neb., 39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in., planned, Neligh to Hartington, Neb. (extension).

Manufacturers Light & Heat Co.—50 miles, contracted, near Pittsburgh, Pa.; 75 miles, near Bradford, Pa.; Britton Contracting Co., contractor.

Michigan Consolidated Gas Co.—180 miles, 24-in., planned, Austin, Mich., to Detroit.

Mid-South Gas Co.—40 miles, 12-in. Helena to Forrest City, Ark.; Tulsa Construction Co., contractor; Frank McCoy, spreadman; field office, Marianna, Ark.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

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Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—62 miles, 20-in., Murrysville, Pa., to Petersburg, Ohio; Williams-Austin Co., contracted.

New York States Natural Gas Corp.—26 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp.—37 miles, 20-in., authorized, Boom Station, Pa., to Cayuta, N. Y.

New York State Natural Gas Corp.—27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

New York State Natural.—164 miles, 16-in., planned, Ithaca to Albany, N. Y.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Oklahoma Natural Gas Co.—40 miles, 16-in., Velma to Chickasha, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—53 miles, 26-in., under way, Edmond to Depew, Okla.; Trojan Construction Co., contractor; "Swede" Tillotson, spreadman; Stroud, Okla., field office.

Oklahoma Natural Gas Co.—40 miles, 16-in., planned, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salina to Kilig City, Calif.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Pipe Line Corp.—2,175 miles, 26-in., planned, Texas Gulf Coast to Pacific Northwest.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas, Tex.

Piedmont Natural Gas Co.—1,350 miles, 20-in., planned, Greenville, Miss., to Carolinas.

Potomac Gas Co.—18 miles, 16-in., Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

South Central Alabama Natural Gas Co., Inc.—150 miles, proposed, central Alabama.

South Georgia Natural Gas Co.—248 miles, planned.

Southeastern Michigan Gas Co.—55 miles, 12¾-in.; under way; from point near Clawson, Mich., to Port Huron, Mich.; H. L. Gentry Construction Co., contractor; field office, Utica, Mich.; spreadman, Frank Morris.

Southern Natural Gas Co.—120 miles, 16-in.; under way; Mitchell Village, Ala., to Bolingbroke, Ga.; Associated Pipe Line Contractors, Inc., contractor; Columbus, Ga., field office; Lacy Walker, spreadman.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

Sunray Oil Corp.—133 miles, 3-30-in., system for Snyder gasoline plant, Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 26-in., La Gloria to Refugio, Tex.; Midwestern Constructors, Inc., contractor of Schedule 1; M. T. Wilhite, superintendent; field office, Refugio.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11. M. T. Wilhite, superintendent; field office, Du Quoin, Ill.

Texas-Illinois Natural Gas Pipeline Co.—117 miles, 30-in., Effingham to Sigley, Ill., Midwestern Constructors, Inc., contractor of Schedule 12.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13.

Texas-Illinois Gas Pipe Line Corp.—400 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. A. M. Berlander, general superintendent; field offices at Newport, Ark., J. E. Richardson; Texarkana, Ark., V. L. Williams; Popular Bluff, Mo., A. M. Berlander.

Texas-Illinois Gas Pipe Line Corp.—200 miles, 30-in., contracted; Trinity River to Texarkana; H. C. Price, contractor. Work under way.

Trunkline Gas Co.—278 miles, 20-in., contracted, Valley of Texas; R. H. Fulton & Co., contractor.

Trunkline Gas Co.—1,775 miles, 10-26-in., planned, includes 740-mile, 26-in., Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,035

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miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1, 1952.

Trunkline Gas Co.—176 miles, 26-in., under way, Darnell, La., to Longville, La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Olla, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to Senatobia, Miss.; Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss., to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Clark Williams, Memphis, Tenn., spreadman.

Trunkline Gas Co.—186 miles, 26-in., contracted, Joppa to Tuscola, Ill.; Mahoney Contracting Co., contractor of Section D, main line.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

Trunkline Gas Co.—71 miles, 20-16-10-in., contracted, Longville, La., south; Houston Contracting Co., contractor of Section 1, lateral line.

United Gas Pipe Line Co.—93 miles, 6 to 16-in., proposed, fields in Plaquemines Parish to near New Orleans.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

Valley Gas Pipe Line Co., Inc.—800 miles, 24-in., proposed, Berclair, Goliad County, to northeast Saratoga, Hardin County, Texas, to Vermilion Bay area of Louisiana.

Valley Gas Pipe Line Co., Inc.—1,000 miles, 30-in., proposed, Saratoga northeast to Arcadia, La., to El Dorado and Jonesboro, Ark., Cape Girardeau, Mo., Lawrenceville, Ill., Terre Haute, Ind., and Atlanta, Ind., thence to northeast terminal point in southern Michigan.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,408 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Pipe Lines.—1,200 miles, 22-in., planned, Southern Alberta to Duluth, Minn.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Middle East Pipelines, Ltd.—800 miles, 34-36-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—160 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Shell Caribbean Petroleum Co.—11 miles, 16-in., authorized; Bachaquero (north) to Lagunillas, Venezuela, 5-51.

Shell Caribbean Petroleum Co.—165 miles, 10-in., authorized; Palmarejo to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 12-51. Land sections contracted by Williams Brothers, de Venevuela, S. A., Charles P. Williams, manager, Marvin E. Jones, superintendent.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles, 4-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—103 miles, 4-in., planned, Puerto Berrio to Medellin, Colombia.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Estrada de Ferro Santos Jundial.—32 miles, 10-in., under way, Santos to Sao Paulo, Brazil; Techint, contractor.

Estrada de Ferro Santos a Jundial.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor.

Northern Pipe Line, Ltd.—300 miles, 10-in., planned, Montreal, Que., to Toronto, Ont., Canada.

Petroleos Mexicanos.—155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar, to Bogota, Colombia; Williams Brothers Corp., David Louthen, manager, Bogota.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—Under way, Lodi to Milan, Italy.

Azienda Generale Italiana Petroli.—Under way, Lodi to Turin, Italy.

Azienda Generale Italiana Petroli.—Under way, Lodi to Genoa, Italy.

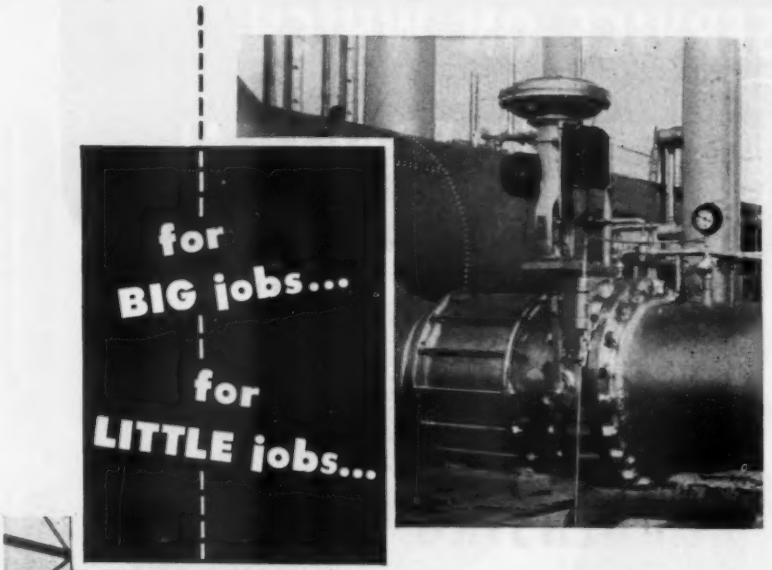
Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

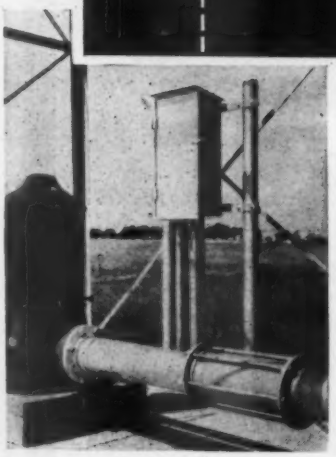
Direccion General del Gas del Estado.—32 miles, under way, Comodoro Rivadavia to Caleta Olivia, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico.

Petroleos Mexicanos.—260 miles, 20-in., considered, Monterrey to Tampico and Poza Rica, Mexico.





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Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas, to Mexico City, D. F.

Venezuela Atlantic Transmission Corp.—195 miles, 10-12-16-in., planned, El Placer near Las Mercedes, State of Guarico to Caracas, La Guaira, Maracay, and Valencia. Contracted by Williams Brothers, de Venezuela, S. A., B. E. Barnes, manager.

New Atlantic Gulf Hearing

WASHINGTON. — Proceedings on Atlantic Gulf Gas Co.'s application to build a 1,731-mile natural-gas pipe line extending from southeastern Louisiana through Mississippi, Alabama, Georgia, South Carolina, and northern Florida have been reopened by the Federal Power Commission.

The most recent estimate of the total over-all cost of the project is $98,700,000. The company proposes to serve 53 communities in Alabama, Georgia, South Carolina, and Florida, and 22 industrial customers. Total annual fifth-year sales are estimated at 95,254,843,000 cu. ft.

Hearing on the petition is scheduled for May 14. In order to secure approval for the project, Atlantic Gulf must introduce evidence of firm commitments for sufficient sales of its pipe-line capacity to show that it is able to finance and support the proposed facilities, and that the project will be economically feasible, FPC said.

The original Atlantic Gulf application was filed in April 1947. Hearings were twice postponed at the company's request, and the commission has twice reopened the proceeding to permit the company to prove its case.

Pennsylvania Line Sought

WASHINGTON.—Pennsylvania Gas Co., of Warren, Pa., is seeking Federal Power Commission authorization for construction of a 52-mile pipe line, and installation of five new compressor units in Pennsylvania.

The new 12¾-in. line, would extend from the company's mixing plant in Warren, Pa., to a mixing plant in Erie, Pa. It would be laid parallel to existing transmission lines between Warren and Erie. During the winter the line would be used to augment the supply of natural gas to Corry and Erie, and during the summer months it would be used to transport gas to the company's storage areas.

Three of the new gas-compressor units are to be installed at the company's Roystone compressor station in Warren County, Pennsylvania. The other two would be placed in operation at the Sackett compressor station in Elk County, Pennsylvania.

Total estimated capital cost of the construction is $2,200,000, which would be financed by the sale of long-term installment promissory notes to Pennsylvania Gas Co.'s parent, National Fuel Gas Co.

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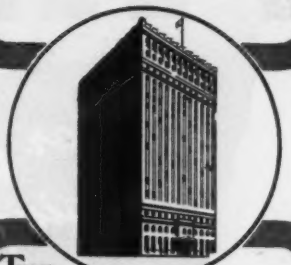

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Among the Drilling Contractors

Wichita Drilling Firm Sells Oil Production

Birmingham - Bartlett Drilling Co., Wichita, one of Kansas' most active contractors, has disposed of a substantial portion of its producing holdings to Emmett Pratt, Tulsa independent. The sale involves its interest in 12 scattered leases in Barton, Pawnee, Rice, Rooks, Russell and Stafford counties. On the leases are 33 oil wells with a gross production of approximately 800 bbl. daily. About two-thirds of the company's total daily production is represented in the transaction. Cash consideration was reported to have been slightly more than $1,000,000. The company retains considerable undeveloped acreage. E. L. Birmingham, Jr., W. N. Bartlett, and Richard Hindery are owners of the company, a partnership formed in February 1948.

Olson Drilling Co., Tulsa, is the contractor on a wildcat test which Humble Oil & Refining Co. is starting in Section 47, Block X, CCSD&RGNG Survey, in Crane County, West Texas. Location is for 3 Cowden.

Speer Drilling Co., Wichita, is drilling on two new contract jobs. One is a rank wildcat test for I. W. Siegel at 1 Schraeder, NW SE NW 3-24-24, 9 miles southwest of the Jetmore pool, in Hodgeman County, western Kansas. The other is for Calkan Oil & Gas Co. of Santa Maria, Calif., at 1 Smith, NE NE SW 24-19-7, 4 miles southwest of the South Odessa pool, eastern Rice County, in west central Kansas.

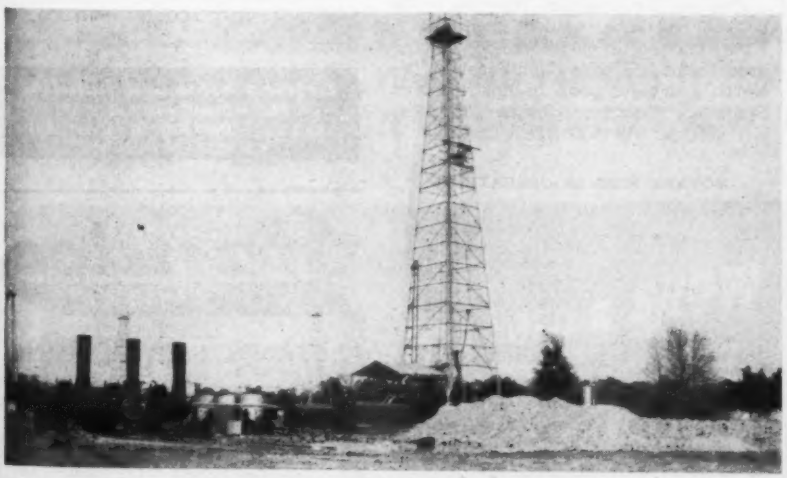
Fleet Drilling Co., Ada, Okla., has the contract for a projected 4,800-ft. wildcat test which Bay Petroleum Corp. and others are starting at 1 Webber, NW NE NW 28-20n-4w, south of the Brown pool, southern Garfield County, western Oklahoma.

Kemp Drilling Co., Shreveport, has started on another well for Sun Oil Co. in the South La Grange field, Adams County, Mississippi. It is 9 Barnum, located in the SE 49-6n-2w.

Trant-Phillips Drilling Co., Dallas, has a rig in the Douglass field, Nacogdoches County, southeastern Texas, where it is drilling for Humble Oil & Refining Co. at 1 Hayter, Hiram Ham Survey.

Woods Drilling Co., New Orleans, has drilling under way on another deep test on the "Golden Trend" in central Oklahoma. Latest operation is 1 Harris, C SW SE 13-5n-3w, McClain County. Projected depth is 10,180 ft. The test is being drilled for the company's own account.

Clarke Drilling Co., Billings, Mont., has contracted for a 6,000-ft. wildcat



Wright Drilling Co., Houston, has been keeping one of its heavy-duty steam rigs busy on the south flank of the old Humble salt dome, in Harris County, Texas Gulf Coast, where development of Yequa sand production, discovered in April 1950, is continuing. The rig, with its 136-ft. derrick, is shown in the above picture on the location of a well recently drilled and completed for Brown & Rasnick, independent operators who discovered the new pay zone on that sector of the dome. The zone is found at depths of 6,000 to 6,500 ft.

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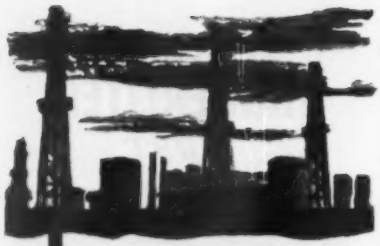

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test to be drilled for A. B. Cobb and associates of Cut Bank, Mont., in southwestern Cheyenne County, Nebraska. Location is for 1 Crusader-State, NW NW NW 36-13n-53w.

C-N-B Drilling Co., Wichita Falls, Tex., is putting down, on a contract with C. L. Carlock, a Simpson test in the area about 4 miles east and a mile north of Comanche, in Stephens County, southern Oklahoma. It is on land owned by the city of Comanche in the NW NE NW 13-2s-7w. Contract is for 3,800 ft. Location is about 2 miles from other production.

Deardorf Oil Corp., Oklahoma City, which drilled the rotary hole for the extension well which Dooley Engineering Co. is completing east of the Richards pool in eastern Stafford County, Kansas, has moved its rig to another wildcat location about ½ mile to the north where it will drill another test for the same operator. The extension well is 1 Nolte, SE SW NE 29-22-11, drilled to a total depth of 3,605 ft. in the Arbuckle. The new location is for 1 Hathaway, SE SW SE 20.

Austin Stewart Drilling Co., Shreveport, has moved a rig to a wildcat location about 3½ miles southeast of Hiram, Wilkinson County, Mississippi, where it will drill a Wilcox sand test for its own account. Projected depth is 8,200 ft. Location is for 1 Cory, in 24-3n-1e.

Fleet Drilling Co., Ada, has taken a contract for a 7,500-ft. test to be drilled for Max Pray of Chicago and C. L. Crowell of Oklahoma City in the area southwest of Wilson, in Carter County, Oklahoma. Location is for 1 Sullivan, SE SW SW 17-5s-3w.

Eckland Drilling Co., Wichita, is the contractor on a wildcat test which Kruse & Porter are drilling in the area about 3½ miles northeast of the North Fairview pool, in northeastern Sedgwick County, Kansas. The test is 1 Melick, SW NW SE 21-25-2e.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 2-26-51	Change week ended 2-19-51	Change week ended 2-27-50
Gulf Coast	520	+19	+ 19
W. Tex.-N. M.	759	+14	+ 87
Ark.-N. La.-E. Tex.	129	+ 2	— 11
Oklahoma	243	— 1	+ 2
Kansas-Nebraska	125	—19	+ 10
Illinois-Eastern	31	—42	— 26
Rocky Mountains	102	— 2	+ 42
Pacific Coast	135	0	— 6
Total U. S.	2,044	—29	+117
Western Canada	110	+ 8	+ 27
Total	2,154	—21	+144

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the West Texas-New Mexico and Oklahoma-Kansas areas are shown by charts on pages 144 and 145.

W. J. Coppinger, Wichita, has a rig on a rank wildcat location in northwestern Hodgeman County, western Kansas, where he is contracting for Metropolitan Petroleum Co. of New York. The location, 1 O'Brien, is in the C NW NE 18-21-25, about 15 miles northwest of the Jetmore pool, opened by Shell Oil Co. last year.

Puckett Drilling Co., Oklahoma City, is drilling for Finston & Co. on a wildcat location about 6½ miles north and a little west of Chandler, Lincoln County, central Oklahoma. The test is 1 Biswell. Spot location is in the NE NE NW 5-15n-4e.

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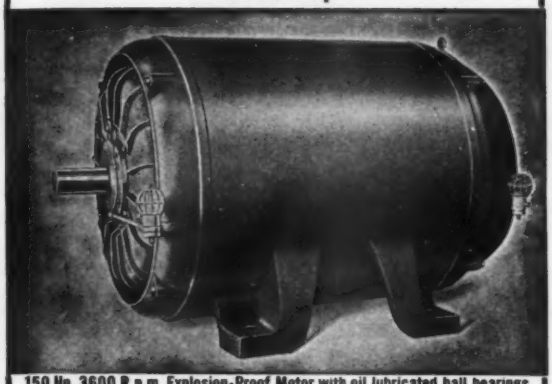

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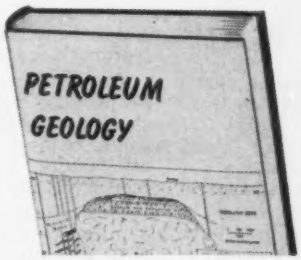

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NATURAL GAS

Underground Dome Found

CHICAGO.—James F. Oates, chairman of Peoples Gas Light & Coke Co., has announced that Natural Gas Pipe Line Co. of America and Texas-Illinois Natural Gas Pipe Line Co. are conducting a geological investigation of an underground dome in northeastern Illinois which tests have shown may be capable of storing as much as 80 billion cubic feet of natural gas.

Exploration of the dome is proceeding in Kankakee County. The area is close to Joliet where terminals of both Texas-Illinois and Natural Gas Pipe Line are located. Both companies are subsidiaries of Peoples Gas Light & Coke.

Investigation indicates the area contains a large dome-shaped, gas-tight rock formation deep below the surface with a stratum of permeable water-bearing sandstone underlying the dome.

Geologists believe natural gas from pipe-line systems can be injected into the sandstone trap under sufficient pressure to force back the water and hold gas until it is needed, Oates said.

Completion of the project would permit storage of gas during the summer months for use during the winter when demand exceeds the capacity of long-distance lines from southwestern fields.

A bill which would grant eminent domain for the development of underground-storage facilities was introduced in the Illinois senate recently.

Merger of Companies O.K.'d

WASHINGTON.—Colorado Interstate Gas Co., of Colorado Springs, has been authorized by the Federal Power Commission to acquire and operate the facilities of Canadian River Gas Co., also of Colorado Springs.

It was the second time the merger application had come before FPC. The two companies were authorized in July 1950 to build a new Texas Panhandle-to-Colorado pipe line, but the merger proposal was side-tracked until the commission could hear testimony on the reasonableness of payments by Colorado Interstate to Southwestern Development Co., which controls Canadian.

Conditions in the proposal provided that rights to liquid hydrocarbons in place will be granted to Southwestern Development Co., with Colorado to receive 50 per cent of the gross proceeds from the sale of certain liquid hydrocarbons, plus 15 per cent of the net revenue from hydrocarbons resulting from operation of the Fritsch natural-gasoline plant of Texoma Natural Gas Co.

The authorization was conditioned to provide that Colorado Interstate shall not propose any increases in rates, subject to FPC jurisdiction, attributable to the acquisition and merger.

Through the acquisition of Canadian properties, Colorado Interstate will get plant facilities valued at $12,500,000 and gas reserves estimated at $150,000,000, according to Charles E. McGee, attorney for Canadian River.

Applications Consolidated

WASHINGTON.—The Federal Power Commission has consolidated the applications of six New England utility companies, all of which are seeking natural gas from Northeastern Gas Transmission Co., with Northeastern's pending application for authority to serve additional markets in the area.

Northeastern requested the commission to consolidate its application with those of the six utilities, on the ground that common questions of law and facts are involved.

The six New England companies, all of which have asked the FPC to direct Northeastern to extend its transmission facilities to connections with the utilities in the areas they serve, are: Portland Gas Light Co., of Portland, Me.; Biddeford & Saco Gas Co., of Saco, Me.; Gas Service, Inc., of Exeter, N. H.; Allied New Hampshire Gas Co., also of Exeter; Greenfield Gas Light Co., of Greenfield, Mass.; and Gardner Gas Fuel & Light Co., of Gardner, Mass.

The commission previously issued an order dismissing Northeastern's application, except for the part in which authorization is requested for service to Greenfield Gas Light Co. and Gardner Gas Fuel & Light Co. and to distributing companies in Maine and New Hampshire.

Phillips' Hearing Set

WASHINGTON.—Whether the Federal Power Commission has jurisdiction over independent producers and gatherers of natural gas will be determined at a hearing set for April 3, when FPC looks into natural-gas operations of Phillips Petroleum Co.

The commission claims that it does have jurisdiction, under the Natural Gas Act of 1938, as soon as the independent producer or gatherer sells his product to companies involved in interstate traffic.

Operations by Phillips include production, purchase, gathering, and transportation of gas produced in the Southwest, and sales to several companies for interstate transportation and resale to consumers.

Hearings have been postponed several times in recent months. When first scheduled last December, Phillips filed a motion with the commission asking that hearings be postponed until after the national emergency. FPC then postponed hearings indefinitely.

In its order last week, the commission said that sufficient cause had not been shown to justify further delay.

Plant Contracts for Gas

NEW ORLEANS.—Kaiser Aluminum & Chemical Corp. has entered into a long-term contract with United Gas Pipe Line Co. for upward of 70,000,000 cu. ft. of natural gas daily for fuel for a new aluminum plant in St. Bernard Parish, Louisiana.

The aluminum-reduction mill will cost an estimated $79,000,000, and will be in partial operation by the end of the year. When operating at full capacity, it will have 1,000 workers and will produce 200,000,000 lb. of aluminum annually. The new production will enlarge the firm's total output to 540,000,000 lb. per year.

Announcement of the new plant followed closely a statement made 2 weeks ago by Rep. Edwin E. Willis (D., La.) who said the aluminum-expansion program had been "badly fumbled," and that the best way to speed it up would be to build new plants in the Gulf Coast area where abundant supplies of natural gas are available *(The Oil and Gas Journal, February 22, 1951, page 222)*.

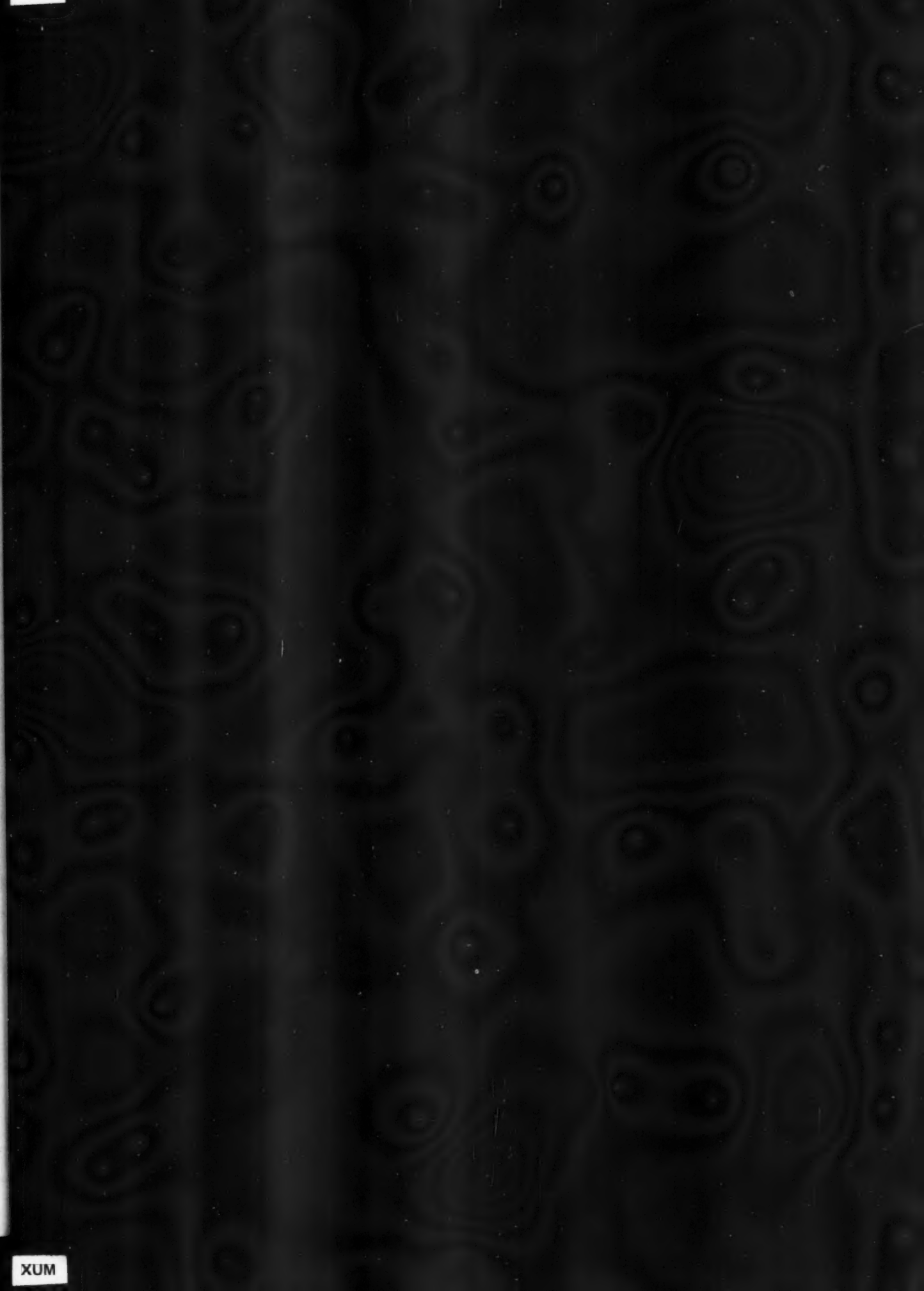
1948 FPC Reports Out

WASHINGTON.—The Federal Power Commission has announced issuance of Volume 7 of "Federal Power Commission Reports," containing FPC's opinions and decisions during 1948.

The 1,212-page volume includes, in addition to all formal opinions issued by the commission between January 1, 1948, and December 31, 1948, intermediate decisions which have become final and an appendix of selected orders in the nature of opinions. The publication also contains index-digests of the opinions, decisions, and orders. Also, for the first time a table showing the rules of the commission cited has been issued.

With the publication of this volume, all opinions and decisions issued by the commission between January 1, 1931, and December 31, 1948, are made available in the reports.

Copies of Volume 7, which is buckram bound, may be obtained from the Publications Section, Federal Power Commission, Washington 25, D. C. The price is $4.25 per copy.



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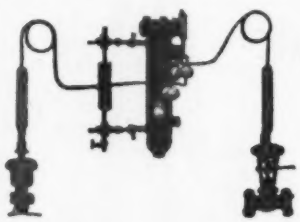

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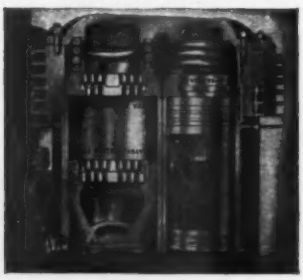

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REFINING

New Hypersorber

Dow Chemical Co. plans to erect big tower soon

MIDLAND, Mich.—Erection of the new 207-ft. Hypersorber at the Dow Chemical Co. plant here may be completed in another week, according to officials of Austin Construction Co.

The big tower, claimed to be the largest of its type, will separate light hydrocarbon gases. It was transported by rail from Carteret, N. J., in two sections. Low-slung flat cars were specially built to carry the tower, but even then the first section scraped railroad property and clearance adjustments were necessary.

The sections were placed end to end ready for field welding by the middle of February. Size and thickness of the shell necessitate preheating during the welding period. One weld on a 1¾-in. plate is to require stress relieving at 1,300° F. A 5-ft.-diameter weld will be made to join the auxiliary tank to the main portion of the column near the top.

Lifting.—The Hypersorber will be lifted as one unit weighing 587,000 lb. Through use of eight sheaved blocks, two hoisting steam engines will lift the column through 190-ft. "stiff legs," which were rented by Dow from Sun Oil Co. Each leg, weighing 20 tons, was shipped in six sections, and raised with a 30-ton crane. It took workers 2 weeks to assemble and raise them due to difficult rigging work caused by great height and wind.

After erection of the shell, installation of piping, attached platform, insulation, and internals will bring weight of the finished tower to about 400 tons.

Approximately 125,000 lb. of trays must be assembled in the interior through 30-in. manholes at various levels of the 12-ft.-diameter tower. Until the new column is ready for operation sometime in June, Dow will continue to use a smaller Hypersorber which recovers heavy gases from a fuel-gas stream.

Platforming Units Multiply

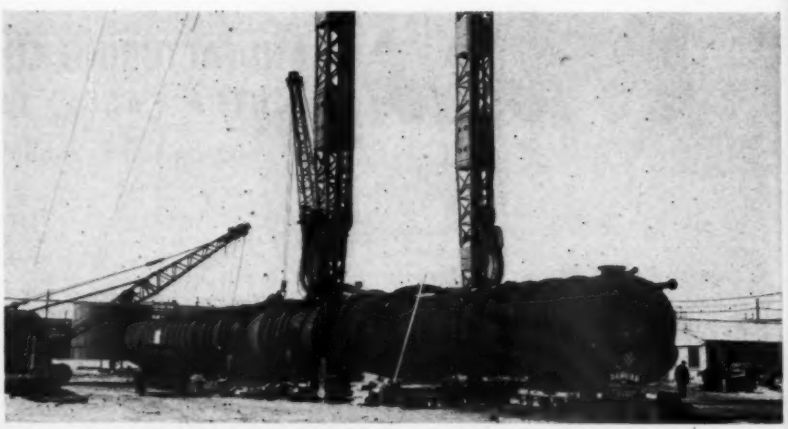
CHICAGO.—A total of 14 Platforming units with an aggregate capacity of 66,050 bbl. per day are either operating or under construction, according to Universal Oil Products Co., discoverer and developer of the process. Included in the total is Old Dutch Refining Co.'s 1,500-bbl. plant, first commercial unit to operate under the process since October 1949.

Other refiners are currently studying merits of the process as applied to their individual needs, and the number of Platformers should soon be increased, Universal said.

Proof of the success of the process in upgrading straightrun and naphtha stocks was provided through operation of the initial Old Dutch plant, Universal said, thereby confirming predictions based on the company's long-range, semicommercial application.

It has been learned the Platforming process will produce in quantity light aromatic hydrocarbons that are necessary to meet increased aviation-gasoline-production needs as well as needs for chemicals.

Plants now under construction, all begun in the last 17 months, and their daily capacities in barrels are: Kendall Refining Co., Bradford, Pa., 1,500;



LARGEST HYPERSORBER.—This 207-ft. tower, claimed by Dow Chemical Co. to be the largest of its type, will soon be erected at Dow's Midland, Mich., plant. The two main sections are shown here placed end to end for field welding. On either side are construction "stiff legs" which will be used to lift the tower into position.

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"Mobile Power Houses"

MARCUS HOOK, Pa.—Railroad locomotives, pressed into service because of a serious delay in the delivery of new boiler equipment, are playing a unique role in the production of military aviation gasoline at Sun Oil Co.'s refinery here.

A dozen of the engines were leased from Pennsylvania Railroad and Reading Railway Co. and placed on sidings inside the refinery to help provide steam requirements for making the gasoline, pending installation of the new boiler. By using the locomotives, the company has been able to meet in full its aviation-fuel commitments to the Armed Forces.

Steam from the engines on the sidings passes through manifolds to lines connected with the refinery's main steam system and supplements the supply from existing sources. These sources were inadequate, since manufacture of aviation gasoline requires much more steam than is needed to make ordinary motor fuel.

An order for a large new boiler was placed several months ago when it became apparent to Sun that heavier military requirements would overburden existing steam facilities. However, abnormal delays held up construction.

Refining Briefs

Filtrol Corp. has started test production of catalytic agents at its new $3,500,000 Salt Lake City plant. Arthur D. Yates, general manager, said the plant now is making a fluid catalyst and under normal operating conditions production is expected to exceed 100 tons per day.

The company plans to put a $500,000 thermofor catalytic cracking unit into operation at the plant by midsummer for production of pellet catalysts.

Inland Refining Co., Palestine, Tex., has announced plans for refinery modernization which include the installation of catalytic polymerization and Perco units. The Perco unit is being designed to crack gas oil catalytically at a rate of 400 bbl. per day. A Selas furnace using ceramic-cup burners as a radiant-heat source will be installed.

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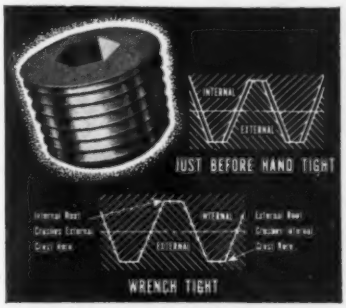

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LEADING THE FIELD OF SEISMIC EXPLORATION

Rockies' Stature Grows

THE meeting of petroleum geologists in Denver last week (see news section of this issue) was not planned for the purpose of singing the praises of the oil and gas possibilities in the vast and sparsely tested Rocky Mountain area. However, many of the geologists presenting "what's-been-learned-to-date" papers were much too optimistic to pass up an opportunity to express some of the potentialities they see for the region.

In summary, this byproduct of the meeting pointed to a great future for the Rockies, which during the past 10 years have seen a rapid increase in the demand for oil and gas from developed and developing fields. The current demand for Rocky Mountain crude has reached a point where exploratory efforts can no longer be considered just sound foresight, but must be considered a necessity. Rocky Mountain geologists are going to have to find a substantial share of the million barrels of additional daily production needed by this country.

In Wyoming the development in the Sussex-Meadow Creek area on the southwest margin of the Powder River basin, Johnson County, is the current activity center. Here production has been found in the Sussex, Shannon, Frontier, and Lakota sands, all Cretaceous, and development is under way in six pools. In Converse County, the Glenrock area is yielding 35°-40°-gravity paraffin-base oil from the Cretaceous-Muddy and Dakota sands as development begins to unfold this geologically complex portion of the south rim of the Powder River basin. Then there's Beaver Creek-Lakota gas field in Fremont County, which is believed to lie over one of the largest undeveloped oil reservoirs in the Rockies. Tensleep oil has been found in this field and its development is assured. Deeper horizons, especially in the Mississippian, are considered first-class prospects.

The area attracting the most intense interest in Wyoming right now is Slick Creek, opened the latter part of last year by General Petroleum Corp. in 32-47n-92w, Washakie County. The discovery well flowed over 1,000 bbl. of 33.5°-gravity oil daily from the Permian-Phosphoria limestone at around 10,500 ft. without the aid of acid, which is normally used so generously in Worland field to the north. Interest in this field really reached a peak when General Petroleum staked a location 1½ miles east of the discovery and proceeded to complete it last month for 1,300 bbl. daily. Two other wells are now drilling in this field, one a mile south of the second well and another ½ mile west of the discovery.

A great future was also forecast for Utah's enigmatic Uinta basin, but only if a large number of preconceived ideas on how to locate oil-bearing zones are discarded and new approaches developed. Electric logs don't reflect the oil-filled fracture zones in these Tertiary shales, at least not in the same way they do oil-bearing sands. Perhaps through the development of interpretating methods of temperature surveys and caliper logs an answer may result which will be of value, not only in the Uinta basin, but in other parts of the country where oil-filled shale fractures have not been considered in the rush to reach a sand or limestone.

The Mid-Continent-type basin on the eastern edge of the Rockies, most frequently referred to as the "Denver basin" during this Denver meeting, has been having trouble with Cretaceous correlations, but this confusing problem is being attacked and sound results are beginning to evolve. Once correlations are established the development rate in this area is likely to be stepped up considerably.

Down in the Four Corners region of Arizona, Colorado, New Mexico, and Utah, the San Juan basin stands out as the most promising of the three basins in this area, at least in the immediate future. The structural and stratigraphic possibilities for oil in this often-called "gas area" in the wedge edges of Mesozoic and Paleozoic strata are considered enormous. Continental Oil Co.'s recent discovery of "typical" southern Rocky Mountain sweet, 59°-gravity crude oil from the Mississippian-Ouray at Table Mesa is believed to be but a sample of what this basin holds in store.

Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTHWEST TEXAS.—Strawn lime gas production apparently is being opened at R. J. Caraway 1 Guida Rose, NW¼ of GC&SF Survey 2, which will establish the first commercial producer in Val Verde County (see field report, this issue).

WEST TEXAS.—Honolulu and Signal 3 Underwood had flowing oil from the Canyon reef on drill-stem test at 9,334-9,554 ft., extending Ropes field production southwest. Oil flowed in 20 minutes and tanked 65 bbl. in 1 hour. On the west side of the field the same operators' 1 Monroe had water in the reef at 9,748 ft. In Midland County, Cumberland & Weiner 1-17 Fasken extended Germania Spraberry field 1 mile southeast with a flowing potential of 210 bbl. of oil through 10/64-in. choke.

NORTH TEXAS.—L. W. Barrett 3-B McCall-Fooshee, Barrett field well southeast of Montague, completed flowing 1,152 bbl. of 40°-gravity oil a day through ½-in. choke. Pay section was open hole from 6,386-6,404 ft., total depth.

ROCKY MOUNTAIN AREA.—Continental Oil Co. is starting an exploratory drilling program in the North Salt Creek area, Wyoming, near the important Sussex-Meadow Creek fields. Kirk Oil Co. failed at a south extension effort in the new Bonanza field, Wyoming. Carter Oil Co.-Stanolind Oil & Gas Co. are coring ahead at the Bluebell, Utah, deep test with the well now below 12,043 ft.

Kansas

Seward County Wildcat Is Maximum Producer

THE maximum potential rating (3,000 bbl. of oil per day) has been established by the rank wildcat producer which Jomilson Producers, Inc., has completed in the Light Ranch area in southern Seward County, in the southwestern part of the state. The well, 1-B Light, C SW 11-35s-32w, had a bomb potential rating of more than 11,000 bbl. per day. Its actual flow on production tests through various-sized top and bottom-hole chokes averaged approximately 28 bbl. per hour with gas production being gaged at 47,571,000 cu. ft. per day. Flow presures varied from 1,960 to 1,760 psi. Gravity of the oil was 41.6° at 70° F.

Production is from the Mississippian Morrow sand, topped at 6,005 ft. (—3,257 ft.) and opposite which casing, cemented at 6,341 ft., is perforated at 6,020-30 ft. Hole was drilled to a total depth of 6,342 ft.

The discovery, located about 8 miles southeast of Liberal and a mile north of the state line, is approximately 2 miles north of the Light Ranch gas producing area across the line in northwestern Beaver County, Oklahoma Panhandle.

On the Oklahoma side of the line between the new Jomilson well and the Light Ranch gas production, J. M. Huber Corp. has a prospective well (1 Wallace, C SW NW 15-6n-21eCM) in the same sand section that may prove a link in connecting the two areas and establish another two-state field. That well obtained substantial gas flows and good showings of distillate in two drill-stem tests, one taking in an interval at 5,961-86 ft. and the other at 5,988-6,010 ft. It is believed the zone tested may be one above the interval producing in the Kansas well. Casing has been run through the zone to shut off the gas, and hole, at latest report, was being cored ahead in exploration for the possible oil production deeper in the sand.

Promising oil showings have been encountered by another rank wildcat, located in the far western part of the state. The test is Cities Service Oil Co. 1 Coberly, NW SE SE 15-14-29, south central Gove County, nearly 30 miles from nearest production, the small Arnold pool to the southeast in northwestern Ness County. Showings were in the Marmaton lime, a zone underlying the Kansas City lime. A 30-minute drill-stem test in that zone at 4,284-4,313 ft. yielded 400 ft. of clean oil and 240 ft. of oil-cut mud. Hole is being deepened for a look at potentially productive lower horizons.

Westgate-Greenland Oil Co. and Bay Petroleum Corp. 1 Rolland, SW SW SW 21-1-17, which is opening a new pool 6 miles northeast of the Huffstutter pool in northeastern Phillips County, produced at the rate of 10 bbl. of oil per hour in swabbing tests after reperforating casing lower in its Lansing-Kansas City lime pay zone. Latest perforations are at 3,605-18 ft. Previously, from perforation at 3,597-3,605 ft., the well swabbed only 1 bbl. of oil per hour. The lower interval was treated with 500 gal. of acid. Pumping equipment is being set up for completion. Total depth is 3,758 ft. with casing at 3,757 ft. Top of the Lansing is 3,502 ft. (—1,301 ft.)

Honaker Drilling Co. 1 Kent, NE SE SE 22-1-18, 4 miles southwest of the Rolland well and 2 miles northeast of the Huffstutter pool, made 36 bbl. of oil in the first 12 hours on the pump. Production is from casing perforations at 3,484-92 ft. in the same horizon, topped at 3,337 ft. (—1,180 ft.). It opens the Kent pool.

Westgate-Greenland Oil Co. has another prospective pool discovery in the same county where its 1 Ehm, NW NW SE 23-3-19, a mile southwest of the Stuttgart pool, had oil and gas showings in the Lansing-Kansas City section, topped at 3,127 ft. (—1,137 ft.). A 45-minute drill-stem test at 3,267-98 ft. got 60 ft. of oil-cut mud. More than 30 ft. of it was heavily cut. An earlier test higher in the pay at 3,168-3,212 ft. yielded 20 ft. of oil-cut mud.

J. W. Bird 1 Wright, NE NE NE 14-21-14, a mile northwest of the McGinty pool, in Stafford County, produced at the rate of 3¾ bbl. of oil per hour in swabbing tests of its Lansing-Kansas City pay zone, opposite which casing is perforated at 3,483-88 ft. Previously, the well pumped a small amount of oil with considerable water from the Arbuckle lime, on which casing had been run. Plug then was set at 3,680 ft.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Continental Oil Co. 1 Vine, NE NE NW 23-11s-19w, elev. 1,930 ft., 125 bbl. 22.9°-gravity oil per day from Arbuckle at 3,468-85 ft., TD; Topeka 2,883 ft., Heebner 3,115 ft., Lansing-Kansas City 3,154 ft.

Ellsworth County: Westgate-Greenland 1 Kaska, NW NW NW 15-17s-8w, elev. 1,682 ft., 664 bbl. oil per day from Arbuckle at 3,172-76 ft., TD; Lansing-Kansas City 2,740 ft., Sooy 3,086 ft., Viola 3,108 ft., Simpson shale 3,120 ft., Simpson sand 3,126 ft.

KANSAS WILDCAT FAILURES

Barber County: Nadel & Gussman 1 Moffett, NE NE SE 8-30s-15w, elev. 1,952 ft., dry, TD 5,871 ft., Heebner 3,851 ft., lime 4,046 ft., Lansing-Kansas City 4,065 ft., Massey 4,504 ft., cherty Sooy 4,590 ft., Maquoketa shale 4,610 ft., Viola 4,620 ft. with spray of oil, Simpson shale 4,765 ft., Arbuckle 4,845 ft.

Barton County: Adair 1 Kern, NW NW SW 5-20s-14w, elev. 1,902 ft., dry, TD 3,660 ft., anhydrite 879 ft., Heebner 3,172 ft., Lansing-Kansas City 3,270 ft., Sooy 3,521 ft., Arbuckle 3,607 ft.

Butler County: Gaty 1 Miltner, NW SE NE 6-25s-3e, elev. 1,327 ft., dry, TD 2,890 ft., Kansas City 2,330 ft., Mississippi lime 2,769 ft.

Ellis County: Hamilton 1 Werth, SW SW SW 29-15s-18w, elev. 1,932 ft., dry, TD 2,682 ft., anhydrite 1,095 ft.

Graham County: Wood River 1 Oliver, NW NW SW 24-6s-23w, elev. 2,407 ft., dry, TD 4,005 ft., Heebner 3,613 ft., Lansing-Kansas City 3,636 ft., Arbuckle 3,976 ft.

Barnett et al 1 Van Loeve, NW NW NE 14-9s-22w, elev. 2,257 ft., dry, TD 3,884 ft., anhydrite 1,760 ft., Heebner 3,458 ft., Lansing-Kansas City 3,497 ft., Arbuckle 3,843 ft.

Greenwood County: Edward 1 Kimball, NW NW NE 21-24s-13e, dry, TD 1,673 ft., Mississippi lime 1,633 ft.

Kingman County: Pabco 1 Spain, SW SW SW 5-28s-10w, elev. 1,737 ft., dry, TD 4,553 ft., Douglas 3,440 ft., lime 3,568 ft., Lansing-Kansas City 3,589 ft., Mississippi chert 4,074 ft., Kinderhook 4,152 ft., Viola 4,352 ft., Simpson 4,419 ft., Arbuckle 4,523 ft.

Meade County: Northern Natural 1 Collingwood, C SW NE 8-32s-27w, elev. 2,532 ft., dry, TD 8,083 ft., Hollenberg 2,580 ft., Herrington 2,620 ft., upper Krider 2,650 ft., lower Krider 2,700 ft., Woodford 2,720 ft., Fort Riley 2,790 ft., Wreford 2,980 ft., Lansing-Kansas City 4,380 ft., Mississippi lime 5,560 (?) ft., St. Genevieve 5,700 ft., St. Louis 5,960 ft., Osage 6,500 ft., Viola 6,970 ft., Simpson 7,115 ft., Arbuckle 7,140 ft.

Phillips County: Honaker 1 Muir, SE SW SW 36-5s-18w, elev. 1,884 ft., dry, TD 3,503 ft., anhydrite 1,420 ft., Heebner 2,994 ft., Lansing-Kansas City 3,037 ft., sandy Sooy 3,392 ft., cherty Sooy 3,479 ft.

Rice County: Allan 1 Heter, SE SE SE 21-20s-8w, elev. 1,655 ft., dry, TD 3,418 ft., anhydrite 200 ft., lime 2,841 ft. Lansing-Kansas City 2,866 ft., Sooy 3,253 ft., Viola 3,329 ft., Simpson 3,364 ft.

Rooks County: Peel-Hardman 1 Eagon, SW SW SW 21-8s-18w, elev. 2,003 ft., dry, TD 3,493 ft., anhydrite 1,445 ft., Heebner 3,157 ft., Dodge 3,180 ft., Lansing-Kansas City 3,198 ft., Sooy 3,455 ft., erosional Arbuckle 3,460 ft., Arbuckle 3,463 ft.

Scott County: Amerada 1 Crowell, NE NE NE 35-17s-32w, elev. 2,968 ft., dry, TD 5,354 ft., Herrington 2,746 ft., Krider 2,791 ft., Woodford 2,844 ft., Fort Riley 2,888 ft., lower Fort Riley 2,959 ft., Mississippi lime 4,572 ft., Spergen 4,737 ft., St. Louis 4,580 ft., Warsaw 3,845 ft., Osage 4,955 ft., Kinderhook 5,030 ft., Viola 5,146 ft., Arbuckle 5,195 ft.

Sedgwick County: Carlock 1 Shumway, SW NW SE 24-25s-1e, elev. 1,421 ft., dry, TD 3,035 ft., Burgess 3,004 ft.

Stafford County: Isern 1 Smith, SW SW NE 29-21s-11w, elev. 1,742 ft., dry, TD 3,596 ft., anhydrite 480 ft., Heebner 2,969 ft., lime 3,101 ft., Lansing-Kansas City 3,123 ft., Sooy 3,398 ft., weathered Arbuckle 3,503 ft., Arbuckle 3,589 ft.

Tatlock 1 Smith, SE SE SW 36-21s-11w, elev. 1,759 ft., dry, TD 3,559 ft., Lansing-Kansas City 3,128 ft., Sooy 3,426 ft., Viola 3,431 ft., Simpson 3,482 ft., Arbuckle 3,527 ft.

GMR 1 Hahn, SW SW NW 21-22s-13w, SW SW NW 21-22s-13w, elev. 1,898 ft., dry, TD 3,901 ft., anhydrite 758 ft., Topeka 2,988 ft., Heebner 3,302 ft., lime 3,428 ft., Lansing-Kansas City 3,442 ft., Viola 3,771 ft., Simpson 3,807 ft., Arbuckle 3,851 ft.

EASTERN AND CENTRAL NEBRASKA WILDCAT FAILURES

Blaine County: Kingwood 1 Smith, SW SW SW 10-24n-23w, dry, no TD or tops reported.

Kingwood 1 Schneidereit, C SE 22-24n23w, no TD or tops reported.

Dawson County: Superior 11-24 Dewey, NW NW NW 24-12n-20w, strat test, dry, dry, no TD or tops reported.

Richardson County: Kitrell 2 Fleskoski, NE SW SE 29-2n-16e,, elev. 1,003 (?) ft., dry, TD 2,575 ft., Bartlesville 1,756 ft., Hunton 2,547 ft.

IOWA WILDCAT FAILURE

Mills County: Council Bluff Exploration Trust 1 Thieshafer, C SE SE 6-73n-43w, dry, TD 2,505 ft., Mississippian 890 ft.

Mississippi

Union Finals Tinsley Well for 442 Bbl. Daily

JACKSON.—One of the best completions in Tinsley field, Yazoo County, has been finaled at Union Producing Co. 27 Jennie Stevens, CSW NE SW 12-10n-3w. Through perforations in the McGraw sand at 5,099-105 ft., the well pumped 442 bbl. of 38°-gravity oil daily.

On the west side of the same field, Union and Jones-O'Brien 1 Logan, NW NE 23-10n-3w, is drilling below 12,720 ft., at last report, in search of the Smackover.

Wheless Drilling Co. is rigging up at a new 10,200-ft. Lower Tuscaloosa wildcat 2 miles west of production in Pine Ridge field of Adams County. The well, 1 Eleanor V. V. Williams, 46-8n-2w, is located approximately ½ mile west of Phillips Petroleum Co. 1 Davey, 46-8n-2w, which carried good shows in the Massive sand. After running a string of 5½-in. pipe to 10,166 ft., however, extensive testing operations failed to establish commercial production and the well was abandoned.

Another new wildcat for Mississippi has been staked in the eastern part of Wilkinson County. Austin Stewart 1 Belle E. Cory, 24-3n-1e, is located 3½ miles southeast of Hiram. Drilling operations are expected to get under way immediately.

Drilling operations have been resumed at the world's second deepest well in Stone County, George Vasen 1 Tung Oil Corp., 9-2s-11w, is coring below 20,228 ft. at last report.

At last report, Continental Oil Co. 1 John R. Cameron, et al, SE SW 36-10n-1e, Madison County, was drilling below 12,772 ft.

MISSISSIPPI WILDCAT FAILURES

Adams County: George M. Harrison-Petersen Drilling Co. 1 G. R. Hightower, 60-8n-1w, dry, TD 6,517 ft.

Petersen Drilling Co. 1 A. E. Ellis, 14-5n-1w, dry, TD 6,842 ft.

Pearl River County: Roeser & Pendleton, Ic. 1 Crosby, et al, 13-1s-17e, dry, TD 9,500 ft.

Texas Gulf Coast

Grimes County Wildcat Is Testing at 9,242-50 Ft.

HOUSTON.—Testing operations are under way at Annava Corp. 1 Herbert Youens, a wildcat test 1½ miles northeast of Navasota in Grimes County. Operator perforated from 9,242-50 ft. and swabbed to total depth of 9,321 ft. and ran electric log. The well swabbed a small amount of gas with trace of oil. The following tops were picked by electric log: Cockfield, 2,472 ft.; Cook Mountain, 3,806 ft.; Sparta, 4,15 ft.; Weches, 4,551 ft.; Queen City, 4.718 ft.; and Wilcox 5,262 ft. The wildcat is located in J. B. McNealy Survey.

Atlantic Refining Co. has recompleted 3 G. S. Rives in a new sand which previously had not produced at Hardin field, Liberty County. Originally, the well was completed through perforations at 7,532-44 ft. for 47 bbl. of oil per day on gas lift. Operator squeezed off old perforations and reperforated in Rives sand from 8,004-08 ft. On potential test, the well flowed 116 bbl. of 34°-gravity oil per day through 20/64-in. choke. Tubing pressure was 1,115 psi. The new sander is located in A. B. Hardin Survey, A-46.

Gulf Oil Corp. is reported testing gas-condensate and rat-hole mud through perforations at 10,326-40 ft. in 1 Fred Palm, a wildcat test in the Hillheim area of Austin County. Well is bottomed at 11,006 ft. and has 5½-in. casing set to 10,791 ft. Location of the well is in James Cummings Survey, Abstract 31. It is approximately 1,329 ft. northwest of G. S. Hammonds 1 Walter Schneider, which was completed last year as the discovery well for this area.

Approximately 6 miles northeast of New Ulm production in Austin County, Sun Oil Co. is running production tests at its wildcat, 1 Mikeska, George Grimes Survey, Abstract 44. Operator perforated at 9,313-23 ft. with 40 shots. Through 24/64-in. choke the well flowed 1,600,000 cu. ft. of gas plus 203 bbl. of condensate. Tubing pressure was 650. Through 20/64-in. choke, the well flowed 1,700,000 cu. ft. of gas plus 211 bbl. of condensate, with tubing pressure of 750 psi. Shut-in. tubing pressure was 2,500 psi. On a later 24-hour test, through ¼-in. choke, the well flowed 1,500,000 cu. ft. of gas and 151 bbl. of condensate. Tubing pressure was 2,575 psi. and gravity of the condensate was 57.6°.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Calhoun County: Gas-condensate discovery "Point Comfort"—Falcon Seaboard Oil Co. 1 Mrs. Maude B. Taylor, Phillip Dimmitt Sur., A-11, TD 9,175 ft., perf. 8,419-68, IP: 13,000,000 cu. ft. of gas per day, open flow, plus 42 bbl. distillate per million cu. ft. of gas.

Chambers County: Oil discovery—Sun Oil Co. A-1 Connerly, G. J. Mayes Sur. 106, A-439, 5 mi. SW of Stowell, TD 10,314 ft., perf. 9,520-30 ft., and 9,538-48 ft., IP: 120 bbl. oil per day, 10/64-in. choke, TP 1,800 psi., 34.2° gravity.

Goliad County: New gas pay at West Terrell Point—Paul J. Fly, et al, 1 K. M. Lewis, W. P. Patterson Sur., A-325, TD 5,015 ft., perf. 4,636-40 ft., IP: 17,000,000 cu. ft. of gas per day, open flow, SIP 1,885 psi., TP 1,725 psi.

New gas pay at East Fannin — United North & South Development Co. 1 B. B. & Bobbie Wells Gayle, G. Hall & W. Crane Sur., TD 2,575 ft., perf. 2,567-73 ft. (Catahoula), well shut in, no gage.

Jackson County: New pay at Swan Lake—The Texas Co. 1 E. C. LaBauve, Hugh McGuffin Sur., A-43, TD 9,215 ft., perf.

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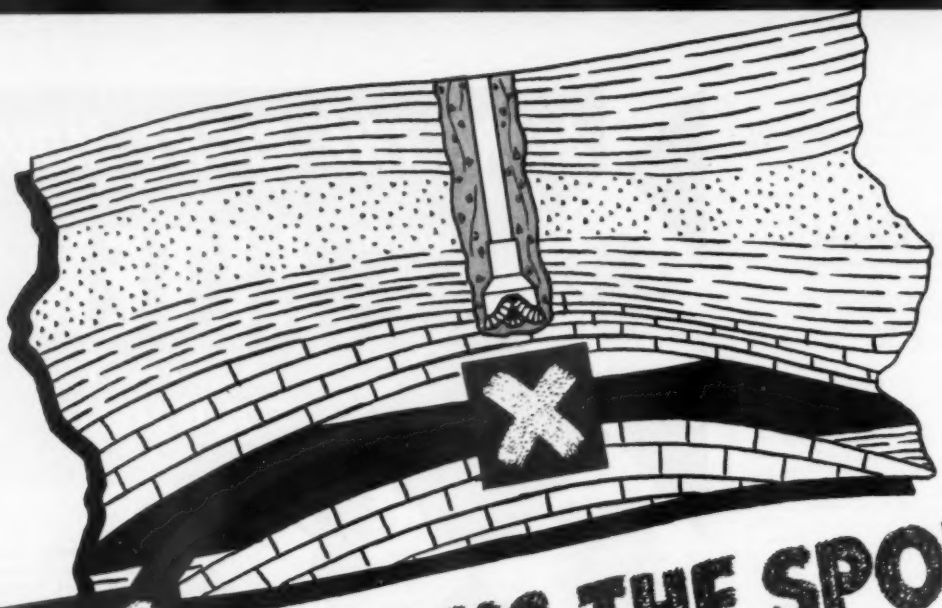

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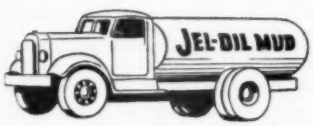

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TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: Stanolind Oil & Gas Co. 1 S. F. Dugat, Warren Craft Sur., A-499, dry, TD 9,510 ft.

Brazoria County: Cecil Hagen, et al 1, J. H. Tigner, Francis Bingham Sur., A-43, 7 mi. SW of Arcola, dry, TD 5,686 ft.

Goliad County: J. D. Wrather, Jr. & Paul J. Fry, et al, B-1 Lulu Swickheimer, et al, Cuadrilla Irrigation Co. Sur. A-316, 4 mi. SW of Fannin, dry, TD 6,050 ft.

Karnes County: McCarrick Oil Co. 1 F. R. Gauntt, Carlos Martinez Sur., A-6, dry, TD 2,979 ft.

Liberty County: The Texas Co. B-1 John A. Deering, et al, E. D. Pruett Sur., A-488, dry, TD 8,981 ft.

Live Oak County: Ryan, Hays & Burke 1 J. L. Gillett, Refugio School Land Sur., A-397, dry, TD 9,148 ft.

Orange County: Gray Wolfe Co. 2 Stark, R. W. Wier Sur., Sec. 4, A-469, dry, TD 8,034 ft.

Refugio County: Louis H. Haring, Jr., & Kirkwood & Co., et al, 1 Mrs. Edith Clarkson, J. Coughlin Sur., A-16, dry, TD 6,165 ft.

California

Drilling Activity in State Shows 25 Per Cent Increase

LOS ANGELES.—Drilling activity in California during the first 2 months of this year increased about 25 per cent over that of the same period a year ago. As of February 24 operators had filed 324 notices of intent to drill with the State Division of Oil and Gas. As of the same date in 1950 they had filed only 258 such notices. Deepening and redrilling jobs also have been higher this year, the respective figures being 166 and 113, according to filings with the division.

Last week operators filed notice for 31 new wells, of which 21 were for field wells and 10 were exploratory tests. In the preceding week there had been 39 notices filed, and the week before that, 65 notices.

Exploratory developments last week included the staking of several important wildcats. About 4 miles west of Kern County's McDonald Anticline field, Macson Oil Co. will drill 34-10 Stoll in 10-28s-19e. Ferguson & Bosworth were below 600 ft. on 1 Porter Community in 19-29s-21e, about ¾ mile west of Salt Creek field.

Also in Kern County and east of Poso Creek, Standard Oil Co. of California has staked location for 23 Davis Community in 3-28s-27e. At its wildcat southeast of McKittrick, in 26-30s-22e, Standard had reached a depth of 6,098 ft. and was cleaning out preparatory to testing up the hole. The wildcat, 68 Van Wert, is about midway between Elk Hills and Midway-Sunset production.

Cuyama Valley has a new test under way, E. H. Christian Drilling Co. 1 Christian in 33-11n-28w, or about 3½ miles west of Russell Ranch production. Midway between Russell Ranch and Morales Canyon, in 14-11n-28w, R. B. Watkins was moving in equipment for 1 Luce. Also in San Luis Obispo County, Sunray Oil Co. was moving in equipment for its joint test with E. A. Parkford in 23-27s-12e. The wildcat is located about 5 miles southeast of Paso Robles.

In the Los Angeles Basin area a new wildcat started was Lumac Oil Co. 1 Gibson-A.U.W. in 19-3s-8w, northeast of Richfield production. In the county's Castaic Junction area an eastern stepout to Del Valle field was completed and The Texas Co. 3 Honor Rancho apparently has successfully extended that field's productive limits about 1,000 ft. to the east.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, Willow Springs group, new sand in southwest portion of Tejon Hills field: Standard Oil Co. of California 58-21 Tejon-3, 21-11n-18w, flowed 147 bbl. 27.1°-gravity crude and 51 bbl. water daily through 24/64-in. bean from 44 ft. of perforations above 1,028 ft., plugged back to 1,030 ft., TD 1,344 ft., elev. 897 ft.

CALIFORNIA UNSUCCESSFUL WILDCATS

Kern County, Antelope Hills area: Shell Oil Co. 72X-31, 31-27s-20e, dry, TD 3,501 ft., elev. 800 ft.

Comanche Point area: Cliff Zillgitt 1 Cliff, 33-12n-18w, dry, TD 692 ft., elev. unknown.

Fruitvale area: Rio Hondo Oil Co. 1 Rio Hondo-Fruitvale, 16-29s-27e, dry, TD 4,072 ft., elev. 409 ft.

McDonald Anticline area: Seaboard Oil Co. 1 Seaboard-Bandini-Theta, 2-28s-19e, dry, TD 4,531 ft., elev. 1,016 ft.

Tejon Hills area: Barnes & Shadrick 8 Star, 1-11n-18w, dry, encountered basement, TD 325 ft., elev. 1,415 ft.

G. A. Grober 1 Grober-Anniversary, 10-11n-18w, dry, TD 467 ft., elev. 1,097 ft.

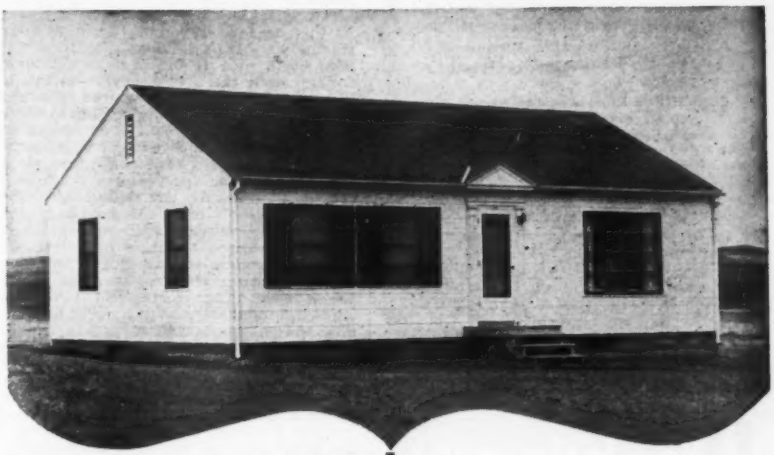
Madera County, Chowchilla area: Los Nietos Co. 22-29 Chowchilla, 29-10s-14e, dry, TD 3,400 ft., elev. 137 ft.

Los Angeles County, Whittier area: General Petroleum Corp. 1 Kruse, projected 8-2s-11w, dry, TD 7,552 ft., elev. 200 ft.

Orange County, Westminster area: Rood-Miller & Assoc. 1 Edwards, 10-5s-11w, dry, TD 5,495 ft., elev. 39 ft.

San Luis Obispo County, Taylor Canyon area: Hancock Oil Co. 22-31 Hancock-Bishop, 31-32s-20e, dry, TD 5,962 ft., elev. 3,264 ft.

Santa Barbara County, Los Olivos area:



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Rocky Mountain

New Drilling Program Is Slated in Powder River Area

DENVER.—During the past year the most active area in Wyoming, from both an exploratory and development drilling standpoint, has been the southwest side of the Powder River Basin. Several important wildcat discoveries and new-pay producers were found in the Big Muddy, Cole Creek, Glenrock, and Sage Spring Creek areas north and east of the town of Casper. Development drilling is continuing in the new fields.

However, the most important discoveries in this area of Wyoming from a Seismic standpoint was in the Sussex-Meadow Creek area north of Salt Creek field. Continental Oil Co. made the first discovery in this area in 1948, and oil is now produced from seven separate pools and four different formations. There have been a total of 125 wells completed since the original discovery.

During the past week Continental announced a new exploratory program for the area, following completion of a farmout deal with Union Oil Co. and others. Under the program Continental will drill a series of three Shannon sand tests on a 12,800-acre block in the North Salt Creek area, Township 41n-79w, west of Meadow Creek field. The North Salt Creek area adjoins immediately on the north of the old Shannon oil pool, where oil was first discovered in 1889. Location has been made by Continental for 1 Federal-Parkman, NW SE NE 17-41n-79w, as the first of a series of wells. Continental is also planning a test to Madison in Sussex pool, the first well below the Sundance in this area. Location for the latter test has not been announced.

An important extension has been abandoned in Bonanza pool, Big Horn County, Wyoming, limiting production to the south in this field. The well is Kirk Oil Co. 1 State, NW SW NE 36-49n-91w, 1½ miles south and slightly east of the discovery well in the field. The discovery was completed last year flowing 250 bbl. of oil daily through 8/64-in. choke from Tensleep between 2,483-2,528 ft. The Kirk well was some 160 ft. lower structurally on Tensleep than the discovery well.

Coring is continuing at the Carter Oil Co.-Stanolind Oil & Gas Co. wildcat on the Bluebell Unit in Duchesne County, Utah, with the well now below 12,043 ft. The well, 1 Unit, CSW NE 6-1s-2w, is believed to be in Wasatch formation, below the basal Green River productive zone at the Roosevelt discovery, located northeast of Bluebell. It is expected that operator will soon run casing for tests through the basal Green River zones, where numerous shows of oil and gas were encountered when the zone was drilled. However, the well has been a disappointment, as no sizable recoveries have been obtained of numerous tests of both basal Green River and Wasatch zones.

COLORADO WILDCAT FAILURE

Willard, Logan County: E. R. McElroy and P. R. Clark 1 Grimm, SE SW NE 28-7n-55w, TD 5,649 ft., abn.; Niobrara 4,648 ft., Timpas 4,965 ft., Codell 5,002 ft., Greenhorn 5,160 ft., Muddy 5,446 ft., Dakota 5,543 ft.

WYOMING WILDCAT FAILURES

South Byron, Big Horn County: National Associated Petroleum Co. 1 Macauley-Government, C. Lot 4, 5-55n-96w, TD 6,458 ft., swabbed 25 bbl. oil per day, temp. abn., Torchlight 2,993-3,120 ft., Peay 3,345 ft., first Muddy 4,058 ft., second Muddy 4,118 ft., Dakota 4,235 ft., Morrison 4,471 ft., Sundance 4,735 ft., Chugwater 5,740 ft., Dinwoody 6,010 ft., Embar 6,043 ft., Tensleep 6,151 ft., Amsden 6,243 ft., basal Amsden 6,421 ft., Madison 6,453 ft.

East Allen Lake, Carbon County: Reserve Drilling Co. and U.P.RR. 1 Wister, SW NW SW 17-22n-78w, TD 4,034 ft., abn., Frontier 585 ft., Mowry 1,217 ft., Muddy 1,473 ft., Dakota 1,527 ft., Morrison 1,595 ft., Sundance 2,187 ft., Red Beds 2,544 ft., Tensleep 3,99 ft.

UTAH WILDCAT FAILURES

Heber, Wasatch County: Syndicate Oil & Mining Co. 1 Bullock, SW NE NE 21-4s-5e, TD 1,500 ft., suspended indefinitely.

Teasdale, Wayne County: Parry Oil Co. 1 Mott, CNE NW 20-29n-5e, TD 250 ft., suspended indefinitely.

NEVADA WILDCAT FAILURE

Meridian, White Pine County: Continental Oil Co.-Standard Oil Co. of California 1 Meridian, SW NE SE 31-16n-56e, TD 10,311 ft., abn., Joana limestone 3,600 ft. (Miss.), Pilot shale (Miss.) 3,676 ft., Nevada limestone (Devonian) 3,970 ft.

WESTERN NEBRASKA SUCCESSFUL WILDCAT

Meade, Banner County: Kerr-McGee-Phillips-Stanolind 1 Downer, NE NE SE 6-18n-55w, TD 5,907 ft., pump 323 bbl. oil daily, 7-in. casing at 5,878 ft., Niobrara 4,933 ft., Ft. Hays 5,138 ft., Codell 5,238 ft., Greenhorn 5,382 ft., Graneros 5,447 ft., "D" sand 5,747 ft., "J" sand 5,878 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Chadron, Dawes County: Eben D. Warner 1 Ormesher, CNE NE 17-34n-48w, TD 2,535 ft., abn., Niobrara 1,130 ft., Ft. Hays 1,285 ft., Carlile 1,375 ft., Greenhorn 1,790 ft., Muddy 2,010 ft., Dakota 2,450 ft.

Hayes County: Superior 27-12 iLttle, SE SW SW 12-5n-31w, strat test, dry, TD 4,200 (?) ft., no tops reported.

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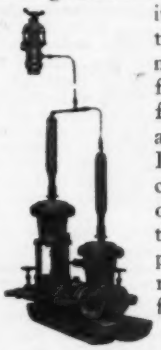

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Appalachian-Ohio

Three Wildcats Staked in One West Virginia County

PITTSBURGH.—Three new wildcat locations have been made in Preston County, West Virginia, on the Kingwood Quadrangle. They are: Portland district, Hope Natural Gas Co. 9636 Margaret C. Kraus, elevation 2,195 ft., .06 mile south of Lat. 39°, 25′ and 4.40 miles west of Long. 79°, 30′, and 9637 Margaret C. Kraus, elevation 2,247 ft., 0.5 mile south of Lat. 39°, 25′ and 4.1 miles west of Long. 79°, 30′; and in Union district, Hope Natural 9638 Margaret C. Kraus, elevation 2,128 ft., 0.8 mile south of Lat. 39°, 25′ and 4.5 miles west of Long. 79°, 30′. In Steele district, Wood County, two wildcat locations in the Limestone Hill area have been abandoned: Morris Oil Co. 1 Delbert and Clara V. Morris, and W. & B. Gas Co. 1 L. D. Bonnett.

Twelve new locations in West Virginia were reported during the past week in the following areas: Washington district, Boone County; Ravenswood district, Jackson County; Harts Creek district, Lincoln County; Kermit and Lee districts, Mingo County; Portland and Union districts, Preston County; Scott district, Putnam County; Murphy district, Ritchie County; Ellsworth district, Tyler County; and Oceana district, Wyoming County.

In North-Central Pennsylvania, in Leidy Township of Clinton County, four new locations have been made: New York State Natural Gas Corp., N-223, 1 John Miller,; N-226, 1 Sophie Cole; Pipe Line Construction Co., 2 State of Pennsylvania Tract No. 7; and C. E. Fralich et al 1 John Meyers. No completions were reported in this area.

In Southwest Pennsylvania in Unity Township of Westmoreland County, Peoples Natural Gas Co. 1-3921 Fred Musnug, elevation 2,100 ft., is now drilling at 7,890 ft. after fishing tools out when the well caught fire from a gas blow-out at a depth of 7,856 ft.

One new location in Southwest Pennsylvania was reported during the past week in Boggs Township of Armstrong County.

In the Mountain Lake Park section of Garrett County, Maryland, operations have been started at two wells: Huntley & Huntley 1 Earl Hershman is building rig and Shaw & Smith 1 George Harvey (Lot) has rig completed. Eberly & Snee 1 Virginia E. Baker is running casing at 3,088 ft. Onondaga lime was topped at 3,072 ft. George L. Yaste 1 Grimes has resumed drilling and is at a depth of 3,580 ft.; Oriskany sand was recorded at 3,514 ft.

OHIO

COLUMBUS.—R. B. Weed et al. 1 McCaslin Consolidation, Section 33, Harrison Township, Perry County, has prospects of production. The Clinton sand at 3,680-3,721 ft. made 15 bbl. of oil, natural, and was shot with 90 qt. The well is now being cleaned out and will probably flow its production.

J. A. Upham finished his wildcat on 1 Ed Spring, Lot 18, Goshen Township, Tuscarawas County, after a long fishing job. The white sand was dry, but the red at 4,881-4,927 ft. showed 130,000 cu. ft. of gas, natural, and 140,000 cu. ft. 6 days after shot with 1,175 psi. rock pressure. In Jefferson Township, the Stone Creek Brick Co. has moved ⅝ mile to the northwest for another test on the Marsh Lumber lands in Lot 30.

Everett Co.'s attempt to extend Brownsville pool to the George Morehead tract in Lot 13, Hopewell Township, Licking County, was a near failure. The Clinton at 3,021-53 ft. showed 100,000 cu. ft. of gas, natural, and an estimated 300,000 cu. ft. when shut in after shot.

OHIO SUCCESSFUL WILDCATS

Tuscarawas County, Goshen Township: J. A. Upham 1 Ed Spring, Lot 18, Clinton 4,881-4,927 ft., 140,000 cu. ft. gas, TD 4,988 ft.

Southwest Texas

Deep Gas Discovery Well Is First in Val Verde County

CORPUS CHRISTI.—R. J. Caraway apparently has a new deep gas-discovery well in Val Verde County from the Strawn lime, which will open the first commercial production in the county. The well, 1 Guida Rose, NW¼ of GC&SF Survey 2, 24 miles south of Sonora, flowed gas on a drill-stem test run at 9,851-10,003 ft. in the Strawn formation after several previous attempts to get a drill-stem test failed. The successful test was open for 3 hours and 10 minutes. At the end of 1½ hours the well gaged 3,120,000 cu. ft. per day. At the end of 1¾ hours, it was gaged for 2,830,000 cu. ft. per day and at the end of the 3-hour test, it was gaged for 3,400,000 cu. ft. per day. Flowing pressure was 2,000 to 3,000 psi.

The Strawn was topped at 9,888 ft. This discovery lies 40 or 50 miles south of nearest deep production from the Pennsylvanian series in the West Texas region. A commercial discovery here could open a whole new trend of development on the west side of the Edwards Plateau. In this well, Strawn was logged as a solid-lime section, whereas the nearest Pennsylvanian production is in Todd (Deep) field of northern Crockett County, which produces from the Strawn "Crinoidal" reef.

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covery, is now taking open-flow potential. Through perforations at 6,240-54 ft., on 11/64-in. choke, the well flowed 1,700,000 cu. ft. of gas per day. Hole is bottomed at 12,105 ft. It spots in Juan Antonio Villareal Porcion 64, Abstract 41.

In San Patricio County, Texaco is testing 1 Joseph F. Green Estate, wildcat approximately 2 miles southwest of Gregory field. On 12-hour test, using 21/64-in. choke, the well flowed 27,600 cu. ft. of gas plus 159 bbl. of salt water with show of oil after acidizing perforations at 9,535-37 ft. It is located in T. T. Williams Survey 39, Abstract 286.

Final completion has been made on Sun Oil Co. 10 A. C. Jones, wildcat test in Agua Neuva de Abajo Grant, Starr County, opening East Jones field. Through perforations at 4,602-05 ft., the well flowed 137 bbl. of 46.9°-gravity oil daily through 9/64-in. choke. Tubing pressure was 590 psi., and casing pressure 475 psi.

J. W. Gorman has run potential test on B-1 B. W. Cox, San Patricio County gas discovery located 2 miles southeast of Willman field. The well was gaged for 55,000,000 cu. ft. of dry gas per day on open flow, with shut-in pressure of 2,076 psi. Perforations were made at 5,121-26 ft. The new discovery is located in M., P., J. & W. Delgado Survey, Abstract 4.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Kleberg County: Oil discovery—C. G. Glasscock 1 J. O. Johnson, Lot 12, Block 30, Kleberg Town Improvement Co. Subd., TD 7,734 ft., dual completion, perf. tubing 7,630-34 ft., IP: 90 bbl. oil per day, 31.5° gravity, perf. casing 7,438-44 ft., IP: 25 bbl. condensate per day, plus 1,500,000 cu. ft. of gas, ¼-in. choke, TP 700 psi., CP 1,300 psi.

McMullen County: Gas-condensate discovery—Delhi Oil Corp. 1 D. W. Rhodes, F. M. Drake Sur. 78, A-867, TD 7,930 ft., perf. Wilcox 7,315-24 ft., IP: no gage, shut-in SIP 2,600 psi.

San Patricio County: Gas discovery—J. W. Gorman B-1 Cox, M., P., J & W. Delgado Sur., A-4, TD 5,206 ft., 5,121-26 ft. (Stilwell zone), IP: 55,000,000 cu. ft. of gas per day, open flow, SIP 2,076 psi.

New pay at Harvey—La Gloria Corp. 2 J. S. Harvey, Block 9, Rincon Road Subd., TD 9,285 ft., perf. 8,102-10 ft., IP: 60 bbl. oil per day, ½-in. choke, TP 100 psi., CP 900 psi., 42.5° gravity.

New pay at Harvey—La Gloria Corp. 3 J. H. Harvey, Block 9, Rincon Road Subd., TD 9,353 ft., perf. 8,630-35 ft., and 8,638-42 ft., IP: 208 bbl. oil per day, 10/64-in. choke, 42.1° gravity.

Starr County: Oil discovery "East Jones"—Sun Oil Co. 10 A. C. Jones, Agua Nueva de Abajo Gr., CCSD&RGNG Sur. 275, TD 4,796 ft., perf. 4,602-05 ft., IP: 137 bbl. oil per day, 9/64-in. choke, TP 590 psi., CP 475 psi., 46.9° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bell County: A. . Johnson 1 Florence C. Howard, W. J. Johnson Sur., A-1,302, dry, TD 2,264 ft.

Brooks County: The Chicago Corp. 1 Brijido Ramirez, La Encantada & Encino del Pozo Gr., dry, TD 6,173 ft.

Cameron County: The Texas Co. 1 Phillip Wardner, Tract 50, Santo Gr., 12 mi. NE of Rio Hondo, dry, TD 9,867 ft.

Jim Hogg County: O. W. Killam 1 F. E. Perez, Block 14, Share 2, Las Animas Gr., dry, TD 3,070 ft.

Nueces County: Atlantic Refining Co. 1 Jan S. Womack, Cuadrilla Irrigation Co. Sur., A-465, 6½ mi. E of Driscoll, dry, TD 9,997 ft.

Miami Operating Co., Inc., 1 Benjamin Groeneveld, Sec. 46, Richard King Farm Lots, dry, TD 6,500 ft.

San Patricio County: Irene Oil & Gas Co. 3 Mrs. B. F. Collins, Ed J. McGloin Sur., 3½ mi. W of Mathis, dry, TD 4,319 ft.

Quintana Petroleum Corp. 1 J. W. Hunt, J. M. Swisher Sur., A-160, 1 mi. NW of Gregory, dry, TD 10,100 ft.

Stice Drilling Co. & D. T. Dougherty 1 Mary East. P. E. Borden Sur., A-338, 6 mi. N of Mathis, dry, TD 4,724 ft.

Zapata County: Producers Corp. of Nevada & Fred A. Rigby 1 Zaragoza Laurel Estate, Thaxton & Cordz Sur. 632, A-545, 20 mi. E of San Ignacio, dry, TD 3,215 ft.

Canadian Fields

Southwest Leduc Gets Oil Promise

CALGARY.—Keno Oils, Ltd., Edmonton independent, has indicated commercial oil production from the D2 Devonian zone at a venture in the southwest extension area of Leduc oil field. The Keno 1, in LSD 6, 25-49-27w4, ran a 16-minute drill-stem test from 5,234-68 ft. and received a natural gas flow rate of 300,000 cu. ft. daily, plus a pipe recovery of 1,020 ft. of oil with no water. The hole was cored to 5,278 ft., and further testing is now under way. If it proves to be commercially productive, the well will mark a ½-mile extension to the west. The nearest producer is Calmar-Devon 1, D2 Devonian oil well.

Imperial Oil, Ltd., will start drilling its first exploratory well in Manitoba early in March. The well, Imperial-Birtle 1, in LSD 1, 27-17-26w1, will be located about 6 miles north and east of the town of Bartle. Spudding in of the new wildcat follows years of geologic study by the company in the southwest part of the province. During the last year the search has intensified with the emphasis on the use of seismic equipment, the method which played a major role in the discovery of Leduc and Redwater fields in Alberta.

California-Standard Co. has set string of production casing at its Daly 10-18 well in the Virden area of southwestern Manitoba. The well, located in LSD 10, 18-10-27w1, completed drilling at 2,334 ft., and set 7-in. casing to 2,220 ft. Crew will run gamma ray log and acidize, with further operations slated to get under way shortly. The limestone zone which yielded the discovery was cored at the follow-up well, but was not drill-stem tested. Indications of production, however, are considered favorable.

The discovery well, Cal-Standard-Daly 15-18, is on pump, yielding about 30 bbl. of gross fluid per day, of which about 15 bbl. per day is crude oil of 35°-gravity. The water cut is between 50 and 60 per cent.

Roxboro Oils, Ltd., Calgary independent, has struck a large flow of natural gas in the Basal Cretaceous at its first solely owned wildcat in Alberta, a venture in the Big Lake area north of Acheson. The gas flow came from the top portion of the Cretaceous, and coring and testing is continuing through that horizon. The well, Roxboro-Big Lake 1, in LSD 4, 36-53-26w4, ran drill-stem test from 3,693-3,708 ft., and received a maximum natural gas flow rate estimated at 8,000,000 cu. ft. daily. Coring is now proceding below 3,721 ft.

Lower Cretaceous oil production has been found on a 40-acre tract in the Leduc-Woodbend area that already has a D3 Devonian oil well located on it, and has assured D2 Devonian production. The drilling that has shown the new Cretaceous pool is being carried out by Bay Petroleum Corp. Although several well sites at Leduc-Woodbend have shown oil production from a combination of two of the three producing horizons (Lower Cretaceous, D2 Devonian, and D3 Devonian), Bay's 40 acres is believed to be the only one that found oil in all three zones.

The interesting well is Bay-Woodbend 6, in LSD 3, 31-50-26w4, in the same LSD as Bay-Woodbend 5, D2-D3 ½-mile extension oil success. The new venture found the Lower Cretaceous sand from 4,223-56 ft. The sand was variable, but carried saturation throughout, with the top section tight and the lower part good and porous. A 20-minute drill-stem test was run from 4,227-59 ft., with a ¼-in. bottom-hole choke. A flow of natural gas reached the surface in 3 minutes, with estimated flow rate of 100,000 cu. ft. daily. Oil flowed in 17 minutes. When pipe was pulled it contained 570 ft. of light oil, no water. Gravity of the oil is comparable to the D3 Devonian crude at Leduc-Woodbend. The hole is now heading for its D2 objective where oil production was assured at its twin, Woodbend 5, D3 producer. A further well, to tap the Cretaceous on that 40 acres, will be drilled at a later date.

CANADIAN WILDCAT FAILURES

Canadian Fina et al. Bulwark 1, LSD 10, 20-38-12w4, TD 2,936 ft.

P. C. Charter-Elnora 1A, LSD 15, 8-35-23w4, TD 7,410 ft.

Imperial-Halfway Lake 1, LSD 12, 15-59-24w4, TD 4,130 ft.

Decalta Woodbend 1, LSD 13, 21-51-25w4, TD 5,360 ft.

Bailey-Imperial-Linaria 1, LSD 11, 24-61-27w-4, TD 3,000 ft.

Gulf-J. E. Savage 6, LSD 6, 10-39-20w4, TD 6,225 ft.

Can-Tex-Calvan-Baugh 1, LSD 3, 33-38-20w4, TD 5,551 ft.

South Louisiana

Five New Wildcats Are Staked in South Louisiana

NEW ORLEANS.—Wildcatting gained new impetus in South Louisiana with five new wells being staked.

In Jefferson Parish, The Texas Co. 1 Bernstein Brothers, 4-17s-23e, on the firm's East Delta Farms prospect, will be drilled to a total depth of 12,500 ft.

The same company also staked location for a rank wildcat in Orleans Parish, with the project designated as 1 State-Lake Bergne, north 10,340 ft. and east 22,037 ft. from USC&GS Station "Alligator 1934," in Lake Bergne. Proposed depth of the well is 10,000 ft.

A new wildcat for Avoyelles Parish is H. L. Hunt 1 Haas Investment, CSW NE 36-1s-4e, which has a projected depth of 10,500 ft. It is rumored that Lamar Hunt Trust Estate is planning an 11,500-ft. wildcat in the same parish, but no details are known.

Down in Terrebonne Parish, Humble Oil & Refining Co. 1 State Lease 1,869-Four League Bay, wildcat, 32-20s-13e, is circulating mud at 14,256 ft. The well was drilled to a total depth of 14,395 ft. and plugged back to 14,256 ft.

Shell Oil Co. is drilling at 13,553 ft. in its Atchafalaya Bay wildcat, 1 State Lease 1,593, Twp. 18s-10e, St. Mary Parish.

Sun Oil Co. has tested new perforations in its wildcat near North Vinton field, Calcasieu Parish, and still found the flow unsatisfactory. The well, 1 Brooks, 20-10s-12w, is bottomed at 11,000 ft. Through perforations at 10,862½-74½ ft., operators ran a 2-hour drill-stem test and recovered 2,800 bbl. of fluid. Flow was through a ⅛-in. choke, and tubing pressure was 2,300 psi. Recovery was 15 per cent oil and the remainder salt water. Operators squeezed off these perforations and plan to go higher to effect a better completion.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Beauregard Parish: New oil pool—Fidelity Oil & Royalty Co. 1 Edgewood Land & Logging Co., 18-6s-9w, TD 9,352 ft., perf. 8,522-46 ft., IP: 167 bbl. oil per day, ¼-in. choke, 43.8° gravity, TP 1,125 psi., CP 1,625 psi.

East Baton Rouge Parish; New pay at Burtville—Shell Oil Co. 2 V. J. Gianelloni, 50-8s-1e, TD 11,085 ft., perf. 9,701-06 ft., IP: 250 bbl. oil per day, 9/64-in. choke, TP 1,940 psi., 42.5° gravity.

Lafourche Parish: New pay at Chacahoula—Sun Oil Co. 2 Levert-Morvant Co., 58-14s-15e, TD 14,506 ft., perf. 14,200-02

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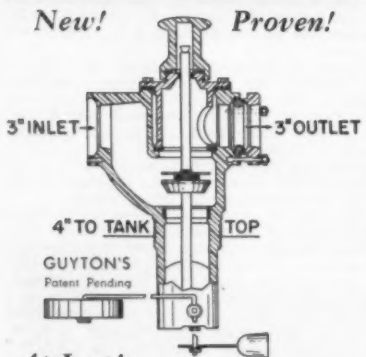

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ft., IP: 502 bbl. oil per day, 8/64-in. choke, 29.1° gravity, TP 5,700 psi.

St. Mary Parish: Gas discovery—Sun Oil Co., et al, 1 Zenor, 42-15s-11e, TD 13,596 ft., perf. 11,385-92 ft., IP: 18,000,000 cu. ft. of gas per day, open flow, TP 3,656 psi., SIP 4,115 psi.

SOUTH LOUISIANA WILDCAT FAILURES

St. Martin Parish: Texas Pacific Coal & Oil Co. 1 Regis La Grange, Acct. 1, 46-8s-6e, dry, TD 11,176 ft.

Terrebonne Parish: Sohio Petroleum Co. A-1 State of Louisiana Lease 1,600, Atchafalaya Bay, dry, TD 11,675 ft.

Michigan

Jerome Township Wildcat Yields Oil After Treatment

MOUNT PLEASANT. — Acid treatment with 4,000 gal. was completed at Michigan Oil Co. 1 State-Herome, NW SW NE 13-15n-1w, Jerome Township wildcat, Dundee oil discovery in Midland County, late last week. The Dundee formation took the 4,000-gal. treatment in 16 hours at a maximum treating pressure of 1,850 psi. First 5 hours on test after acid shot well flowed 75 bbl. of net oil, 130 bbl. of gross fluid, after which time it was shut in.

The next morning the wildcat failed to flow. Tubing pressure was reported to be showing at 85 psi., casing pressure at 850 psi. with 1,500 ft. of fluid standing in the tubing. A swabbing unit will be moved to well site as soon as the water level, reported to be standing at 2 ft. around the well head, recedes.

On the basis of early production tests after acid, operators estimated that this wildcat might produce an average of 30 to 50 bbl. of oil a day. The new Jerome Township discovery is being produced from a plug-back depth in the Dundee of 3,795 ft., plugged back from 3,820 ft. where a small showing of water was logged. Top of Dundee was picked at 3,683 ft. and the well showed 600 ft. of free oil, natural, in 48 hours from a pay logged at 3,755-58 ft.

Production tests were being continued at Basin Oil Co. 1 Winter, NE NE SW 15-21n-1e, Edwards Township wildcat in Ogemaw County, where oil pay was encountered in the Dundee at 3,362-75 ft. The well has been swabbing about 50 to 60 bbl. of oil a day, natural, with a small water-cut showing after hole was plugged back from 3,375 to 3,372 ft. The well failed to pump satisfactorily on initial tests and it was discovered that plastic used as a bottom-hole seal was fouling pump valves. Both Basin Oil Co. and Socony-Vacuum Oil Co., major acreage owners in the Edwards play, were preparing offset locations for immediate drilling, but neither had started new drilling operations this week.

MICHIGAN SUCCESSFUL WILDCAT

Muskegon County, Egleston Township gas discovery: Avalon Oil Co. 1 Hartley, NW NE NW 15-10n-15w, Berea, 1,118 ft., 310,000 cu. ft. gas; TD 1,892 ft. (dry in Traverse) PB to 1,155 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Ford Oil Co. 1 Rolph & Stennett, NE SW NW 1-1n-16w, Traverse 1,191 ft., dry, TD 1,237 ft.

Heath Township: Irvele Harrington 1 Nyboer, NE SE SE 8-3n-14w, Traverse 1,475 ft., dry, TD 1,485 ft.

Laketown Township: Wm. C. Vandenberg, Jr. 1 Michaels et al Comm., SE NW SW 35-4n-16w, Monroe 1,704 ft., dry, TD 1,980 ft.

Livingston County, Cohoctah Township: James E. Duffy, Jr., 1 Raddatz, SE SE SW 31-4n-4e, Dundee 1,051 ft., dry, TD 1,189 ft.

Mecosta County, Fork Township: C. W. Collin & H. E. Walton 1 Lake Proper-

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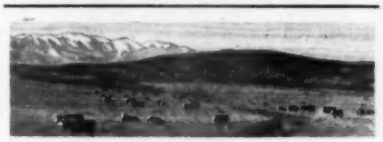

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ties, Inc., NE NW NW 36-16n-7w, Dundee 3,735 ft., dry, TD 3,804 ft.

Osceola County, Sherman Township: Robert Bond 1 Fowless, SE SE NE 25-20n-9w, Dundee 4,193 ft., dry, TD 4,344 ft.

St. Clair County, Greenwood Township: Lloyd C. Green 1 Bonardi, NE SW NW 34-8n-15e, dry in Dundee-Monroe, TD 1,407 ft.

Van Buren County, Columbia Township: Walter A. Elliott 1 Peper, NE SW SE 14-1s-15w, Traverse 1,194 ft., dry, TD 1,201 ft.

Permian Basin

Borden County Venture Shows Commercial Prospects

MIDLAND.—In southeastern Borden County, 2 miles north of Reinecke Canyon lime field, P. R. Rutherford & Sons 1 W. E. Murphy had prospects of commercial production from 14 ft. of the reef limestone.

Top of the reef was logged at 6,909 ft., minus 4,629 ft., which was said to be 32 ft. above the water table as found in Reinecke field. Operators drilled to 6,923 ft., then tested with packer at 6,904 ft. Gas showed in 23 minutes and at the end of 80 minutes recovery was 120 ft. of oil plus 130 ft. of heavily oil-cut mud. There was no water reported. Casing was to be set on top of the limestone and the open section acidized for completion.

Five miles north of Gail, Stanolind Oil & Gas Co. 1 J. E. Miller was drilling ahead at 5,782 ft. after drill-stem testing in the Spraberry from 5,270-5,425 ft. Time was 2 hours and 45 minutes and recovery was 270 ft. of gas-cut mud, 460 ft. of oil-cut mud, 500 ft. of clean oil, and 210 ft. of salt water. Top on the section was 5,280 ft.

In southeast Bailey County, about 20 miles north of the big Levelland San Andres area of Cochran County, Shell Oil Co. 1 W. E. Nichols, 13-212-Crosby CSL, reported gas-cut mud on a drill-stem test from 4,265-4,313 ft. The section tested was not identified. Recovery included salt water and operators continued drilling toward a 9,000-ft. contract.

James H. Snowden 1-32 Carrie S. Dean-Gulf, Dawson County Spraberry discovery, was ready for completion on the pump. The well had produced 80 bbl. of oil in 12 hours, pumping on 25 ft. of perforations between 7,276-7,417 ft.

The same operator's 1-30 Dean-Gulf, 2 miles to the northwest, was shut in for storage after flowing 13 bbl. of oil in 1 hour through 3/32-in. choke, from Spraberry perforations at 7,288-96 ft.

R. J. Caraway 1 Guida Rose, Val Verde County wildcat northeast of Juno, reported dry gas from a Pennsylvanian limestone. Drill-stem test in the wildcat was made from 9,851-10,003 ft. Water blanket and gas reached the top in 19 minutes, followed by mud and at the end of the 3-hour test gas volume had reached 3,000,000 cu. ft. daily. Recovery in the pipe was 360 ft. of gas-cut drilling fluid and mud. Flowing pressure ranged to 3,000 psi. and shut-in pressure reached 6,700 psi. in 1 hour. Operators were drilling ahead on a 10,500-ft. contract.

The 1 Rose reported top of the Strawn at 9,889 ft., which carried a heavy gas kick.

Miami Operating Co., Ballinger, 1 Balmorhea Ranch, southern Reeves County wildcat, developed gas at the rate of 61,000 cu. ft. daily and recovered gas-cut mud having light oil show on a drill-stem test at 8,879-8,958 ft.

The section tested was identified as the Wolfcamp, topped at 8,670 ft., and minus 5,354 ft. Projected depth was 12,000 ft. Location is about 17 miles southwest of the one-well Verhalen Wolfcamp field.

In Southwest Reagan County, Union Oil Co. of California 1-76 University, wildcat 3 miles west of the town of Big Lake, had encountered salt water following a test of the Wolfcamp which yielded 75 bbl. of oil in 24 hours.

An acid treatment between 9,094-9,104 ft. developed a flow of approximately 60 bbl. of fluid in 11 hours, which was mostly salt water. Following that it was shut in 6 hours, then gaged 1.4 bbl. of oil in 1 hour and died, and was shut in for orders.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Coke County: Union Oil Co. of California 4 Jim McCutcheon, 444-1A-H&TC, 4 mi. E Robert Lee, TD 3,987 ft., elev. 1,909 ft., perf. 3,965-80 ft., flowed 92 bbl. 45°-gravity oil in 7 hr., 24/64-in. choke, TP 45 psi., GOR 192 cu. ft.

Crockett County: Cities Service Oil Co. 1-D Owens, 17-GG-GC&SF, 9 mi. NE Sheffield, TD 5,983 ft., PB 5,977 ft., elev. 2,742 ft., Cisco 5,926 ft., pay 5,920 ft., 40,000,000 cu. ft. gas a day, 4 bbl. distillate.

Ector County: Amcan Oil Corp. 2-D Blakeney, 14-A-PSL, TD 10,665 ft., PB 5,716 ft., elev. 3,132 ft., Clear Fork 5,345 ft., 5,540 ft., flowed 217 bbl. of 38°-gravity oil a day, 14/64-in. choke, TP 150 psi., GOR 1,095 cu. ft.

Runnels County: Dallas Consolidated Petroleum Corp. 1 Pape, J. H. Miguel Sur., ½ mi. W Crews, TD 3,971 ft., elev. 1,895 ft., PB 3,934 ft., Gardner 3,894 ft., perf. 3,906-12 ft., flowed 132 bbl. 44°-gravity oil a day, 20/64-in. choke, TP 240 psi., GOR 640 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Coke County: Murray Petroleum Co. 1 Fred Roe, H. Hartman Sur. 498, 6 mi. E Millican field, dry, TD 6,847 ft., elev. 1,899 ft., Ellenburger 6,620 ft.

Concho County: Skelly Oil Co. 1 S. A. Hartgrove, E. F. Lewis Sur. 88, dry, TD 3,285 ft., elev. 1,654 ft., Gunsight 1,580 ft., Ranger 1,920 ft., Winchell 2,020 ft., Ellenburger 3,098 ft.

Cottle County: Humble Oil & Refining Co. 1-J Matador, 15-E-Matador Sur., 3½ mi. NW Paducah, dry, TD 8,087 ft., elev. 2,023 ft., Wolfcamp 2,920 ft., Cisco 3,810 ft., Canyon 6,280 ft., Mississippian 7,224 ft., Ellenburger 7,770 ft.

Crockett County: Frank M. Farley 1 University, 14-10-University Lands, dry, TD 1,735 ft.

Howard County: Stanolind Oil & Gas Co. 1 Buchanan, 25-31-1N-T&P, dry, TD 9,352 ft., elev. 2,474 ft., Spraberry 5,170 ft., Pennsylvanian sand 7,510 ft., Mississippian 8,840 ft., Fusselman 9,080 ft., Montoya 9,220 ft., Ellenburger 9,270 ft.

Irion County: J. V. Massey 1 Sam Cheyney, Sec. 1,241, GC&SF Sur., dry, TD 1,560 ft.

Lubbock County: Humble Oil & Refining Co. 1 V. J. Farris, 29-P-EL&RR, dry, TD 11,783 ft., elev. 3,350 ft., Clear Fork 5,590 ft., Wolfcamp 8,950 ft., Pennsylvanian shale 9,956 ft., Mississippian 10,960 ft., Ellenburger 11,442 ft., pre-Cambrian 11,776 ft.

Lynn County: Sunray Oil Co. 1 Sunray-Sohio-Ernst, 140-12-EL&RR, 3 mi. SE Lakeview, dry, TD 11,000 ft., elev. 3,252 ft., San Andres 4,140 ft., Spraberry 6,660 ft., Dean 8,170 ft. Canyon reef 10,020 ft., Ellenburger 10,935 ft.

Mitchell County: R. S. Brennard, Jr., 1 TXL, 39-29-1N-T&P, 1 mi. N Iatan, dry, TD 8,242 ft., elev 2,177 ft., San Andres 1,700 ft., Clear Fork 3,620 ft., Mississippian 8,051 ft., Ellenburger 8,218 ft.

Reeves County: Buck Jones Drilling Co. 1 J. J. Daughtee, 20-56-T&P, 2¼ mi. NE Orla, dry, TD 3,521 ft., elev. 2,832 ft., Delaware lime 3,116 ft., sand 3,156 ft.

Runnels County: Texas Trading Co., Inc. 1

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M. A. Stevens, GS&SF Davenport Sur., 4 mi. NE Crews, dry, TD 4,331 ft., elev. 2,162, Gardner 4,137 ft., Caddo 4,277 ft.

Harry Todd 1 Elizabeth Hodges, L. Forsythe Sur. 450, 2 mi. S Wingate, dry, TD 5,417 ft., elev. 2,001 ft., Capps 4,420 ft., Morris 4,460 ft., Ellenburger 5,387 ft.

Wilcox Investment Co. 1 Willie Stephens, N. Taylor Sur. 372, 2 mi. E Ballinger, dry, TD 2,507 ft., Serratt 2,312 ft.

Tom Green County: John K. Dorrance 2 C. D. & C. L. Atkins, P. H. Johnson Sur., 7 mi. NW Christoval, dry, TD 3,355 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—H. S. Moss 1 State, Devonian wildcat in northwestern Lea County, topped the Wolfcamp at 8,440 ft. which had some oil odor but was not tested, then tested in the upper Pennsylvanian limestone at 8,530-8,643 ft. and had no shows. It was drilling ahead.

Sharples Oil Co. 1 Seth Alson, 8 miles southwest of Tatum, ran a 3-hour test from 11,163-11,303 ft. Gas showed in 32 minutes and recovery was 685 ft. of heavily oil and gas-cut mud. It was drilling ahead. The well was previously drilled dry to 5,127 ft.

Stanolind Oil & Gas Co. 2 Federal-Leonard, 12-26s-27e, was swabbing around 3 bbl. of new oil an hour after acid treatment on perforations at 8,705-55 ft.

The Texas Co. 1 State "AN," 22-14s-33e, north of the Saunders field, flowed 68 bbl. of 43°-gravity oil in 1 hour on a drill-stem test from 9,856-95 ft.

Tide Water Associated Oil Co. 1 State "D," deep wildcat east of the Lovington area of northeastern Lea County, was drilling shale and lime at 12,131 ft. A core from 11,150-180 ft. recovered lime and shale with no shows. Recovery from 11,120-150 ft. had some oil odor and staining.

SOUTHEAST NEW MEXICO SUCFUL WILDCAT

Lea County: McAlester Fuel Co. 1-A Lula S. Simpson, 26-12s-37e, TD 12,288 ft., PB 9,850 ft., elev. 3,899 ft., perf. Pennsylvanian 9,750-65 ft., flowed 432 bbl. of 43°-gravity oil a day, ¾-in. choke, GOR 600 cu. ft., TP 325 psi.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: Skelly Oil Co. 5-A Lynch, 22-17s-31e, dry, TD 5,040 ft., elev. 3,858 ft., salt 625-1,590 ft., San Andres 3,462 ft., Glorietta 4,945 ft.

North Central Texas

Bend Conglomerate Pay Is Extended East of Bridgeport

WICHITA FALLS—An extension to Bend conglomerate production, and the third well for the area which is 2 miles east of Bridgeport in Wise County, has been completed. The new well, which is reported as producing from a new zone in the conglomerate, is Dwight M. Ross and Reno Oil Co. 1 C. L. Boulware, C. C. Cooley Survey. Completion potential was 11,400,000 cu. ft. of gas daily through open 2-in. tubing and 4,500,000 cu. ft. daily through ¼-in. choke. On elevation of 826 ft., top of the Caddo was 4,740 ft. and pay was from 5,552-69 ft., total depth. Location is a northwest offset to Strawn sand production in the discovery well for the area, and about ½ mile north of the conglomerate discovery.

Wheeler, Ingraham & Jennings Drilling Co. 1 J. R. Clayton, 1½-mile northwest outpost to the Wolf area of Jack County, reported top of the Caddo at 4,485 ft. and good porosity to 4,524 ft. There was some free oil on drill-stem tests of the Caddo.

New Strawn production was in prospect northeast of Antelope in Jack County at Texas-Canadian Oil Corp. 1-A Garrett, BBB&C Survey. Drill-stem test in sand from 3,134-45 ft., open 45 minutes, recovered gas and 60 ft. of clean oil, plus oil-cut mud. A test at 3,889-3,908 ft. recovered oil-cut mud. A second set of perforations from 3,028-47 ft. developed 68 bbl. of oil a day on the pump, and at last report the well was pumping from 50-75 bbl. of oil a day from perforations at 3,038-43 ft. and was ready for completion potential. Total depth was 5,737 ft., in Mississippian limestone topped at 5,716 ft.

In Montague County, Ralph Myers Contracting Corp. 2 J. S. Woods, east offset to a new extension north of the Rogers & Rogers field, drilled sandy limestone showing oil from 4,454-59 ft. Drill-stem test of the section had gas in 70 minutes and recovered 90 ft. of clean oil, plus some oil-cut mud. Operators set casing at 4,453 ft. for completion.

Pennsylvanian production was in prospect at Phillips Petroleum Co. 1 Herrin, Haskell County wildcat northwest of the town of Haskell. Sand was topped at 4,853 ft. and cored to 4,864 ft. Recovery was 6½ ft. of saturated sand. A 1-hour drill-stem test from 4,854-64 ft. had gas in 1 hour and recovered 190 ft. of oil, 90 ft. of heavily oil and gas-cut mud and 60 ft. of gas-cut mud.

Additional saturation was drilled to 4,881 ft. and a test between 4,856-81 ft. had gas in 26 minutes and recovered 3,160 ft. of oil, 120 ft. of heavily oil and gas-cut mud and 95 ft. of salty mud with some salt water. Operators were drilling ahead.

Southeast of Zephyr in Mills County, Pure Oil Co. 1 Triplett was drilling ahead after drill-stem testing in Chappel limestone from 2,002-10 ft. Recovery was 40 ft. of slightly gas-cut mud. Top of the lime was 2,001 ft.

In Stonewall County, west of Old Glory field, W. D. McBee 1 Pomphrey was drilling ahead after drill-stem test from 5,852-60 ft. in conglomerate recovered 2,700 ft. of salt water. An earlier report indicated there was some shows of oil, with mud and water on a test of approximately the same interval.

In western Stonewall County, Cities Service Oil Co. 1 Flat Top set casing at 6,110

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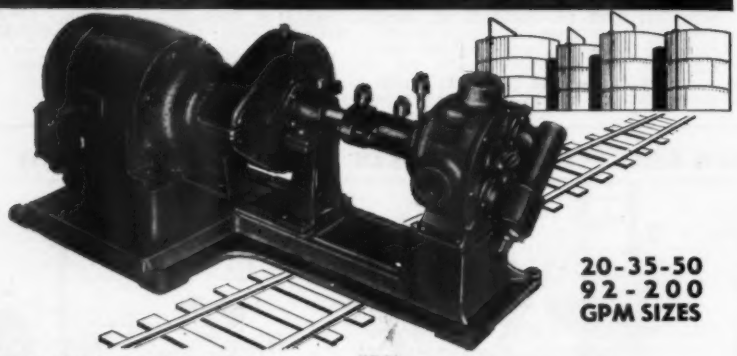

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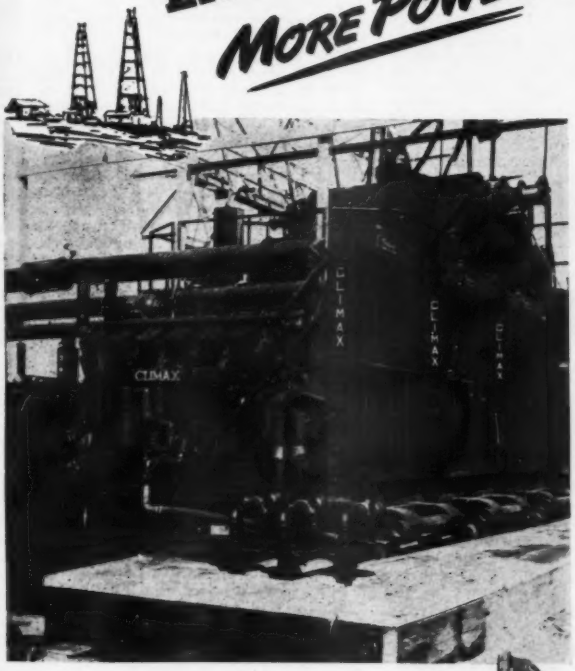

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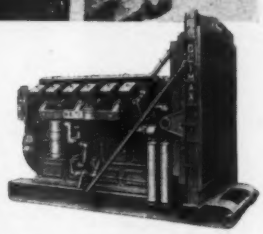

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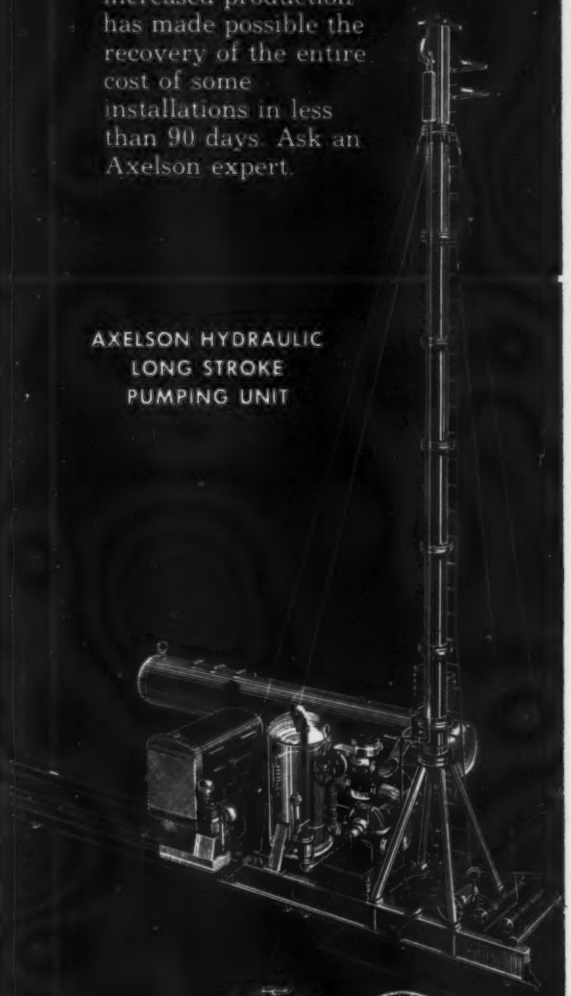

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ft. to test shows in the Caddo conglomerate. It was a failure in the Ellenburger.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: British American Oil Producing Co. 1 W. O. Hayter, TE&L Sur., 3½ mi. SE Megargel, TD 5,209 ft., elev. 1,300 ft., Mississippian 5,019, flowed 198 bbl. 42°-gravity oil a day, 13/64-in. choke, TP 710 psi., GOR 377 cu. ft.

Noel Pautsky 1 R. L. Kempner, SPRR Sur., 2, 3 mi. NE Mankins, TD 2,537 ft., pay 2,533 ft., flowed 146 bbl. 44°-gravity oil a day, TP 30 psi.

Cooke County: F & M Drilling Co. 1 Helena Kleiss, John Trussell Sur., 2 mi. SW Muenster, TD 2,051 ft., Ellenburger 2,046-51 ft., flowed 105 bbl. 32°-gravity oil a day, ¼-in. choke, GOR 500 cu. ft., TP 600 psi.

Eastland County: Bert Fields 1 V. M. Smith, 60-4-H&TC, 3½ mi. NE Cisco, TD 3,797 ft., PB 3,690 ft., Ranger 3,644 ft., flowed 52 bbl. 43°-gravity oil a day, 24/64-in. choke, TP 440 psi., GOR 1,863 ft.

Oil Associates, Inc. 1 J. R. Bacon, 50-3-H&TC, 4½ mi. SE Cisco, TD 3,778 ft., elev. 1,638 ft., Ellenburger 3,722 ft., perf. 3,747-68 ft., pumped 62 bbl. 40°-gravity oil a day, plus water, GOR 310 cu. ft.

Shackelford County: M. J. Mitchell 2 W. H. Green, Sec. 34, BAL Sur., 5 mi. SE Albany, TD 4,373 ft., elev. 1,334 ft., Ellenburger 4,362 ft., flowed 323 bbl. 45°-gravity oil a day, 16/64-in. choke, TP 600 psi., GOR 250 cu. ft.

Wichita County: W. H. Hammon 1-B Louise Thomas Cook, Cherokee CSL, 5 mi. SE Wichita Falls, TD 4,883 ft., pay sand 4,861 ft., flowed 25 bbl. 41°-gravity oil a day, 24/64-in. choke, TP 225 psi., GOR 300 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Reno Oil Co. 1 J. F. O'Donohoe, ATNCL Sur., 10 mi. SW Holliday, dry, TD 4,426 ft., dolomite 3,858-60 ft., conglomerate 4,309-42 ft.

Schultz & Jackson 1 Ray & Massey, BBB&C Sur., 15 mi. SW Archer City, dry, TD 1,404 ft.

Callahan County: J. E. Connally 1 E. F. Shotwell, BBB&C Sur., 3 mi. NW Clyde, dry, TD 2,050 ft.

Clay County: L. T. Burns 1 J. W. Lindeman, Clark & Plumb, 4½ mi. SE Scotland, dry, TD 5,500 ft.

Elvin Walker 1 J. R. Lutz, Orange CSL, 5½ mi. SE Henrietta, dry, TD 970 ft.

Cooke County: Huntley & Pounds 1 Paul Fetsch, Eben Reed Sur., 1½ mi. NE Muenster, dry, TD 1,125 ft.

Coleman County: Haynes B. Ownby 1 W. J. Stevens, W. E. Cole Sur. 156, 10 mi. NW Coleman, dry, TD 3,376 ft., elev. 1,975 ft., Gunsight 1,820 ft., Bunger 1,945 ft., Capps 2,884 ft., Gardner 3,155 ft., Gray 3,240 ft.

Frank Williamson 1 J. L. Wilkenson, 3-2-GH&H, 3 mi. N Coleman, dry, TD 1,781 ft.

Eastland County: Senate Oil Co. 1-A Speegle, 121-3-H&TC, 5½ mi. SW Cisco, dry, TD 4,070 ft., elev. 1,725 ft., Caddo 3,046 ft., Ranger 3,688 ft., Ellenburger 3,989 ft.

J. K. Wadley 1 Willie Parrish, 42-4-H&TC, 5 mi. W Eastland, dry, TD 4,104 ft., elev. 1,529 ft., Mississippian 3,877 ft., Ellenburger 3,887 ft.

Fisher County: Atlantic Refining Co. 1 W. J. Bryan, Austin & Williams Sur., 4 mi. NW Hamlin, dry, TD 6,218 ft., elev. 1,790 ft., Flippen 3,105 ft., Swastika 3,725 ft., Canyon sand 4,430 ft., Strawn sand 5,355 ft., Mississippian 6,065 ft., Ellenburger 6,183 ft.

G. E. Kadane & Sons 1 Burnham, HT&B Sur., 1 mi. SE Royston, dry, TD 6,088 ft., reef 5,250 ft.

Stanolind Oil & Gas Co. 1 J. S. Edwards, 116-2-H&TC, 4 mi. E Rotan, dry, TD 6,600 ft., elev. 1,992 ft., reef 5,790 ft., Ellenburger 5,479 ft.

Jack County: S. D. Johnson 1 G. L. Jones, I. Hughson Sur., 1½ mi. NW Bryson, dry, TD 4,722 ft., Caddo 4,287 ft.

Jones County: Robinson-Puckett, Inc. 2 C. L. Hamilton, 15-1-T&NO, ½ mi. N Anson, dry, TD 2,658 ft., elev. 1,728 ft., Dothan 1,976 ft., Flippen 2,370 ft.

Montague County: Redman Bros. 1 Adams est., ME&P Sur., 7 mi. N St. Jo, dry, TD 3,840 ft. in shale, lime, and granite wash.

Standard Oil Co. 1 Texas 1 Kate Crow, E. A. Walker Sur., 3 mi. SW Spanish Fort, dry, TD 3,132 ft., elev. 840 ft., conglomerate 3,002-64 ft., Ellenburger 2,759 ft.

Nolan County: Rowan & Hope 1 Lake Sweetwater, 62-21-T&P, 8 mi. SE Sweetwater, dry, TD 6,238 ft., Ellenburger 6,105 ft.

Palo Pinto County: R. B. Farris 1 L. B. Ramsey, TE&L Sur., 5 mi. S Perrin, dry, TD 3,668 ft.

Shackelford County: Heidt, Spears & Head 1 B. A. Elliott, Bayland Orphans Home Lands, 8 mi. NE Moran, dry, TD 4,380 ft., elev. 1,331 ft., Caddo 3,658 ft., Ellenburger 4,310 ft.

Stephens County: J. K. Dobbs 1 Ethel Loudder, TE&L Sur. 2263, 8 mi. SW Breckenridge. dry, TD 3,397 ft., elev. 1,270 ft., Caddo 3,376 ft.

Wilbarger County: Burk Royalty Co. 1 Harris, James Collingsworth Sur., 6 mi. NE Oklaunion, dry, TD 2,479 ft.

Eastern Texas

Tight Hole in Kaufman County May Have 3 Pays

DALLAS. — In Kaufman County, T. D. Humphrey 1 Fritz, stepout to production on the north end of Ham-Gossett field, was being drilled tight but field sources credited with three possible pay sections. These were said to be: The upper Glen Rose, which had free oil on tests; the lower Woodbine and the Rodessa were said to have flowed oil. The Bacon zone, which produces in Ham-Gossett field, had no shows.

According to reports, the 1 Fritz topped the Woodbine at 3,420 ft., and developed the flowing oil on a test from 4,025-35 ft. Top of the Paluxy was 5,218 ft. Drill-stem test from 5,780-89 ft., open 1½ hours, recovered 2,800 ft. of 41°-gravity oil and 210 ft. of oil-cut mud. At 6,085-6,135 ft. recovery was 90 ft. of oil-cut mud. Drilling continued below 6,307 ft.

West of production in Pine Mills field of Wood County, J. M. Deupree and Morris Palmer 1 Slayton found 6 ft. of saturated sand in coring from 4,965-75 ft., and a 13-minute drill-stem test of the section recovered 1,380 ft. of oil and 95 ft. of mud. The interval tested was identified as the sub-Clarksville.

In Upshur County, Stanolind Oil & Gas Co. 1 M. M. Irvin, deep wildcat north of Ore City, was drilling below 11,014 ft. in sandy black shale which was thought to be near the base of the Cotton Valley.

Final gage on Hollandsworth Oil Co. 2 Frank Davis, extension well to Woodlawn field, was 9,400,000 cu. ft. of gas daily, plus 96.8 bbl. of 68°-gravity distillate per 1,000,000 cu. ft. of gas. According to reports, the well had 43°-gravity oil on earlier tests.

In Grayson County, Mid-Continent Petroleum Corp. and Skelly Oil Co. 1-D Chiles, wildcat northwest of Pottsboro, was drilling below 5,608 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Falls County: J. H. Harvey 1 John Sims, J. A. Manchaca Sur., 3 mi. E Chilton, dry, TD 1,240 ft.

Hunt County: A. O. Phillips 1 L. P. Snell, James McAdams Sur., 1½ mi. SW Quinlan, dry, TD approximately 4,465 ft., Woodbine 3,225 ft., Paluxy 4,465 ft.

Limestone County: W. W. Lincoln 1 J. W. Compton, P. Varela Sur., 7 mi. NW Mexia, dry, TD 3,308 ft.

Oklahoma

Springer Sand Showings Found in Tatums Test

EXTENSION of Springer sand production to the Tatums pool, Carter County, is indicated by showings encountered by Kerr-McGee Oil Industries, Inc., in its 1 Williams, NW NW NW 11-1s-3w. On the strength of the showings, operators have run casing for production tests. The well is an east outpost for the pool, located west of the town of Alpers.

The Springer zone was topped at 4,587 ft. Hole was drilled to a total depth of 5,078 ft. Casing (5½-in.) was run to 4,842 ft. Zones to be tested first are in the Goodwin sands at 4,606-77 ft. and 4,786-4,802 ft.

Drill-stem tests were made of intervals at 4,594-4,648 ft., 4,669-89 ft., and 4,790-4,818 ft. In the first, gas flowed within 3 minutes at an estimated rate of 1,500,000 cu. ft. per day. Breakdown recovery was 60 ft. of distillate and gas-cut mud. Flowing pressure was 1,125 pis. The second test got a gas flow within 5 minutes at an estimated rate of 500,000 cu. ft. per day, and a recovery of 10 ft. of distillate-cut mud. The third test flowed gas within 15 minutes at an estimated rate of 100,000 cu. ft. per day, and yielded 40 ft. of gas-cut mud with a trace of distillate.

A new Wilcox sand pool is in prospect for western Kay County where Midstates Oil Corp. recovered 140 ft. of 46° oil with 30 ft. of muddy oil and 45 ft. of oil and gas-cut mud in a drill-stem test of that sand at 4,615-21 ft. The test also had a good showing of gas with a flow estimated at the rate of 100,000 cu. ft. per day. Top of the sand is 4,613 ft. The well previously had a gas flow estimated at 857,000 cu. ft. per day in a drill-stem test at 4,184-4209 ft. in Mississippi chat, topped at 4,178 ft. Hole is being cored ahead. The location is about 8 miles northwest of Blackwell.

Sinclair Oil & Gas Co. has a prospective producer at its 1 Garrett, SE SE NW 8-22n-1e, a 10-acre west offset to the recently completed Layton sand discovery well (Dirickson-Lewis Drilling Co. 1 Garrett) of the Northwest Otoe pool, Noble County. The Sinclair well topped the pay at 3,383 ft., and in a 33-minute drill-stem test at 3,380-90 ft. got a good gas flow within 10 minutes and yielded 120 ft. of oil and 90 ft. of oil-cut mud (50 per cent oil). Hole has been drilled to 3,450 ft. and casing run to the top of the pay for completion. The discovery well produces from perforations at 3,408-20 ft. Sunray Oil Corp. 1 Joseph Young, NW NW SE 8, southeast offset to the discovery well, is being put on the pump after swabbing tests in which it made 4 bbl. per hour.

John Lindas Oil, Inc., 1 Cook, SW SE SE 25-18n-1e, which is reviving the abandoned North Coyle pool in southwestern Payne County, swabbed 43 bbl. of oil and 183 bbl. of water in 12 hours while testing the pool's Hunton lime pay zone. Casing is perforated at 4,700-10 ft. Hole is plugged back to 4,714 ft. from its total depth of 5,066 ft. Bottom of the hole is in the second Wilcox sand, which carried water. The well is ¼ mile north of the pool's two abandoned producers.

Extension of the Light Ranch gas producing area in northwestern Beaver County, in the Oklahoma Panhandle, is indicated at J. M. Huber Corp. 1 Wallace, C SW NW 15-6n-21eCM, which encountered strong gas flows and good distillate showings in drill-stem tests in the Morrow (Mississippian) sand. The well, located north of present production, is just south of the Kansas line and less than 2 miles from the wildcat oil producer which Jomilson Producers, Inc., has just completed across the line in Seward County, Kansas (see Kansas report) in the same sand section but possibly in a slightly lower zone.

A 10-minute drill-stem test in the Huber well of an interval at 5,961-86 ft. in the above sand section had gas at the surface

within 2 minutes and flowed at an estimated rate of 8,500,000 cu. ft. of gas per day. Recovery in the breakdown was 120 ft. of distillate and gas-cut mud. A second test, taking in an interval at 5,988-6,010 ft. had gas at the surface within 10 minutes and flowed at an estimated rate of 4,200,000 cu. ft. per day. Tester was closed within 23 minutes because of hydrate formation. Recovery was 10 ft. of distillate and 20 ft. of distillate-cut mud. Casing then was run through the zone to shut off the gas pressure, and at latest report hole was being cored ahead.

OKLAHOMA SUCCESSFUL WILDCAT

Garfield County Roy Walton, Powell et al 1 Peters, SW SE SE 27-22n-4w, flowed 40 bbl. 46.1°-gravity oil per day from Belveal sand at 1,836-48 ft., TD; OWDD OTD 1,418 ft.

OKLAHOMA WILDCAT FAILURES

Caddo County: T. A. Andrus 1 Malone, C SE NW 27-5n-13w, elev. 1,657 ft., dry, TD 440 ft., no tops reported.

Kingfisher County: National Associated Petroleum 1 Tucker, SE SE NW 34-15n-5w, elev. 1,142 ft., dry, TD 7,012 ft., upper Layton 5,759 ft., Checkerboard 6,028 ft., conglomerate 6,151 ft., Prue 6,725 ft., Bartlesville 6,861 ft.

Lincoln County: The Texas Co. 1 Linan, SW NE NW 20-13n-3e, elev. 1,046 ft., dry, TD 6,350 ft., Belle City 3,062 ft., Hogshooter 3,410 ft., Checkerboard 3,770 ft., Big lime-Oswego 4,412 ft., Prue 4,455 ft., Verdigris 4,565 ft., lime 4,730 ft., Red Fork 4,735 ft., Inola 4,850 ft., lime 4,940 ft., Mississippian 5,030 ft., Woodford 5,170 ft., Hunton 5,220 ft., Sylvan 5,270 ft., Viola 5,360 ft., Wilcox 5,472 ft., second Wilcox 5,520 ft., detrital 6,130 ft., Joins 6,220 ft., Arbuckle 6,280 ft.

Payne County: Deardorf 1 Porter, NE NW SW 1-19n-4e, elev. 986 ft., dry, TD 3,636 ft., conglomerate 3,042 ft., Peru 3,076 ft., Big-Oswego 3,111 ft., Prue 3,330 ft., lower Skinner 3,498 ft., lime 3,526 ft., Red Fork sand 3,554 ft.

Pottawatomie County: Falcon-Seaboard 1 Stewart, NW NE NW 20-11n-5e, elev. 964 ft., dry, TD 4,985 ft., Hogshooter 2,394 ft., Checkerboard 2,724 ft., upper Prue 3,509 ft., lower Prue 3,581 ft., Skinner 3,825 ft., Earlsboro 3,953 ft., Bartlesville 4,081 ft., lime 4,193 ft., Mayes 4,452 ft., Woodford 4,620 ft., Hunton 4,678 ft., Sylvan 4,716 ft., Viola 4,812 ft., dense 4,852 ft., dolomite 4,861 ft., Wilcox 4,885 ft., second Wilcox 4,953 ft.

Stephens County: C. B. Christie, Jr. 1 Sitton, SE SE NW 29-2s-6w, elev. 959 ft., dry, TD 1,302 ft., sand 980 ft., lime 994 ft., shaly sand 1,004 ft., lime 1,021 ft., shaly sand 1,030 ft., lime 1,044 ft., broken sand 1,081 ft., sandy lime 1,232 ft., sand 1,258 ft., lime 1,272ft., sand 1,276 ft., lime 1,296 ft.

Washita County: Carter Oil Co. et al 1 Ferguson, NE NE SE 24-8n-18w, elev. 1,663 ft., dry, TD 9,019 ft. in shale and conglomerate, Permian-Pontotoc 3,024 ft., Cisco 4,897 (?) ft., Hoxbar 5,981 ft., Deese 7,522 ft.

Shell Oil Co. 1 Gardener, C NW SW 2-8n-20w, elev. 1,709 ft., dry, TD 11,436 ft., Wellington 2,630 ft., Pontotoc 3,180 ft., granite wash and lime 5,505 ft., granite wash and sandy lime 5,525 ft., granite wash 5,535 ft. and 5,555 ft., granite wash and sandy lime 5,620 ft., sandy dolomite 8,450 ft. and 8,460 ft., sandy dolomite and sand 8,520 ft., sandy lime and granite wash 8,560 ft., 8,590 ft., 8,610 ft., and 8,650 ft., dolomite 8,665 ft., sandy lime 8,700 ft., 8,825 ft., 8,835 ft., 8,850 ft., and 8,875 ft., granite wash and chert 8,920 ft., granite wash and sand 8,968 ft. and 8,985 ft., granite wash and shale 9,035 ft. and 9,055 ft., Viola 9,215 ft., lime 9,745 ft., 9,900 ft., and 9,915 ft., lime and chert 9,930 ft. and 9,965 ft., Caney 10,244 ft., bromide lime 10,410 ft., bromide sand 10,432 ft., lime 10,550 ft., shale 10,558 ft., lime 10,580 ft., shale 10,600 ft. and 10,620 ft., lime 10,670 ft., shale 10,680 ft., 10,820 ft., 10,920 ft. and 10,940 ft., shale 11,200 ft., lime 11,230 ft., 11,240 ft., 11,290 ft., and 11,325 ft.

Louisiana-Arkansas

New Zone Established At Caddo-Pine Island

SHREVEPORT.—Gulf Refining Co. has completed its 279-N Caddo Levee Board, 11-20n-16w, as a new pay in Caddo-Pine Island field, Caddo Parish. The 7,993-ft wildcat, which first tested the Travis Peak, made an official gage of 10,000,000 cu. ft. of gas per day from the Pettit lime at 4,976-88 ft. Recovery included 14½ bbl. of 61.4°-gravity distillate per 1,000,000 cu. ft. of gas.

A LaSalle Parish wildcat was brought in for 70 bbl. of oil per day from the Wilcox horizon. Production at Placid Oil Co. C-1 State of Louisiana Catahoula Lake was from perforations at 4,409-11 ft. Total depth of the well is 5,600 ft., with 7⅛-7-in. casing run to 4,470 ft.

Arkansas.—Miller County had a wildcat near-completion and an interesting new exploratory location this week. Lee & Markham Production Co. and Allyn were tearing down rig and preparing to install pumping equipment after swabbing oil and water at their 1 Price. The test, located in SW SW NE 18-16s-25w, was perforated at 3,311-14 ft. in the Paluxy.

Skelly Oil Co. has located a new test in NW NW NE 28-16s-26w, scheduled to 4,000 ft. The well, 1 Louis Heilbron, is ¾ mile north of Fouke field and separated from the producing area by a dry hole drilled by the same company early in 1946. The failure was Skelly 3 Smith, NE NE SW 28-16s-26w.

NORTH LOUISIANA WILDCAT FAILURE

Grant Parish: Halsey & Stewart 2 Southern Kraft Corp., NE SW 2-7n-3w, elev. 134 ft., dry, TD 4,120 ft., Tallahatta 2,146 ft., Wilcox 2,232 ft.

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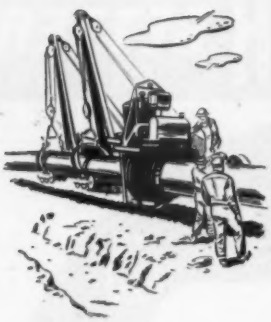

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Illinois-Ind.-Ky.

Devonian Pool Indicated For Montgomery County

A RANK wildcat test located 4 miles northwest of Hillsboro, Montgomery County, Illinois, on the west edge of the Illinois Basin, and about 15 miles from nearest production of any kind, has encountered promising oil showings in Devonian lime, logged at 2,033-38 ft. It is Stewart Oil Co. 1 Morrell, NE NW NE 5-9n-3w. A drill-stem test was made of the above interval, resulting in a recovery of 60 ft. of clean oil and 15 ft. of mud-cut oil. Tester was open 2 hours. Hole has been carried to 2,043 ft. and casing run to the top of the pay for completion.

Max Reese and associates have a prospective McClosky lime discovery well at their 1 Johnson, SW SW NE 36-4s-6w, about a mile northeast of Gentryville, in the extreme southeast corner of Warrick County, Indiana. Saturation was logged at 1,159-63 ft., and before casing was run, oil rose in the hole at the rate of ½ bbl. per hour. The location is from 4 to 5 miles from nearest active production, although there has been some shallower production now abandoned, around the west and north edge of the Gentryville townsite across the line in Spencer County.

Joe Bander and W. W. Toler Drilling Co. 2 Diesser, NE NE NW 1-3n-9e, which opens a new producing area 3 miles west of Olney, Richland County, Illinois, has been put on the pump, making 3 bbl. of oil per hour. Production is from Rosiclare lime, opposite casing perforated at 2,976-82 ft., 2,986-90 ft., and 2,994-97 ft. The area is about a mile east of production in the Clay City-Noble Consolidated pool.

Walter Stegmeir and associates are getting a good Barlow sand well in the Walnut Grove pool, Ohio County, western Kentucky, at their 3 Phillips. The well has 23 ft. of sand, logged at 768-91 ft. After being shot, it swabbed 10 bbl. of water-free oil per hour, filling a 100-bbl. tank in 10 hours. Pumping equipment is being installed.

ILLINOIS SUCCESSFUL WILDCATS

White County: H. D. Atha 1 Delap, SE SW NW 8-7s-8e, IP 52 bbl., Cypress 2,625-31 ft., TD 2,631 ft. (near Gossett pool).

H. D. Atha 1 Ellis Johnson, SW SE SW 8-7s-7e, IP 5 bbl., Palestine 2,031-37 ft., TD 2,037 ft. (near Gossett pool).

ILLINOIS WILDCAT FAILURES

Christian County: Sun Oil Co. 1 Mundhenke, NW NW NW Fractional Section 3-11n-3w, dry, TD 2,725 ft.

Clinton County: Perry Fulk 1 Orphans Home, SW SE NE 27-3n-4w, dry, TD 2,400 ft.

INDIANA SUCCESSFUL WILDCAT

Dubois County: National Associated Petroleum Co. 1 Roman Begle, NW NE NE 24-3s-5w, IP 476,160 cu. ft. gas, Jackson 584-94 ft. and 608-22 ft., TD 1,200 ft. (opens new pool).

INDIANA WILDCAT FAILURES

Daviess County: National Associated Petroleum Co. 1 Brown, SW NW SW 22-3n-6w, dry, TD 1,480 ft.

National Associated Petroleum Co. 1 Creagor, SW NE SE NE 23-3n-7w, dry, TD 1,648 ft.

National Associated Petroleum Co. 1 Lucas, NW NW NW 23-2n-6w, dry, TD 1,043 ft.

National Associated Petroleum Co. 1 Johnson, SE SW NE 10-2n-7w, dry, TD 1,283 ft.

Dubois County: National Associated Petroleum Co. 1 Mann, NE NE NE 36-1n-6w, dry, TD 1,365 ft.

National Associated Petroleum Co. 1 Merkel, SW SE NE 30-1s-3w, dry, TD 2,090 ft.

National Associated Petroleum Co. 1 Fisher, SW SW SE 14-1s-4w, dry, TD 642 ft.

National Associated Petroleum Co. 1 Jasper Mills Corp., SW SW SW 17-1s-4w, dry, TD 803 ft.

National Associated Petroleum Co. 1 Hesanour, NW NE SW 21-2s-4w, dry, TD 817 ft.

National Associated Petroleum Co. 1 Stenflangel, NW NE NW 5-2s-5w, dry, TD 1,012 ft.

National Associated Petroleum Co. 1 Geeken, SW SW SW 25-3s-5w, dry, TD 1,293 ft.

National Associated Petroleum Co. 1 Gehl, SW SE NW 3-3s-4w, dry, TD 873 ft.

National Associated Petroleum Co. 1 Ellis, SW NW NE 13-1s-3w, dry, TD*.

National Associated Petroleum Co. 1 Hollingerm, SW NW NW 24-1s-3w, dry, TD*.

Gibson County: K. D. Holland 1 Bruce, N½ SW SE SE 18-1s-10w, dry, TD 2,040 ft.

Knox County: George & Wrather 1 Hollingsworth, SW SW NW NW Projected Section 16-4n-9w, (Militia Donation 195), dry, TD 1,690 ft.

Owen County: W. G. Burrage 1 Hauser, NE SE NW 5-9n-5w, dry, TD 1,494 ft.

Pike County: National Associated Petroleum Co. 1 Songer, SW NW NW 3-1s-8w, dry, TD 1,477 ft.

Posey County: National Associated Petroleum Co. 1-B Mumford, NW NW NW 31-3s-13w, dry, TD 3,081 ft.

Vanderburgh County: T. W. Drake 1 Heirman, NW NE NE 8-6s-10w, dry, TD 975 ft.

Warrick County: National Associated Petroleum Co. 1 Tisserand, SW SW NW 9-5s-6w, dry, TD 1,758 ft.

*Total depth not released.

(Continued on page 155)

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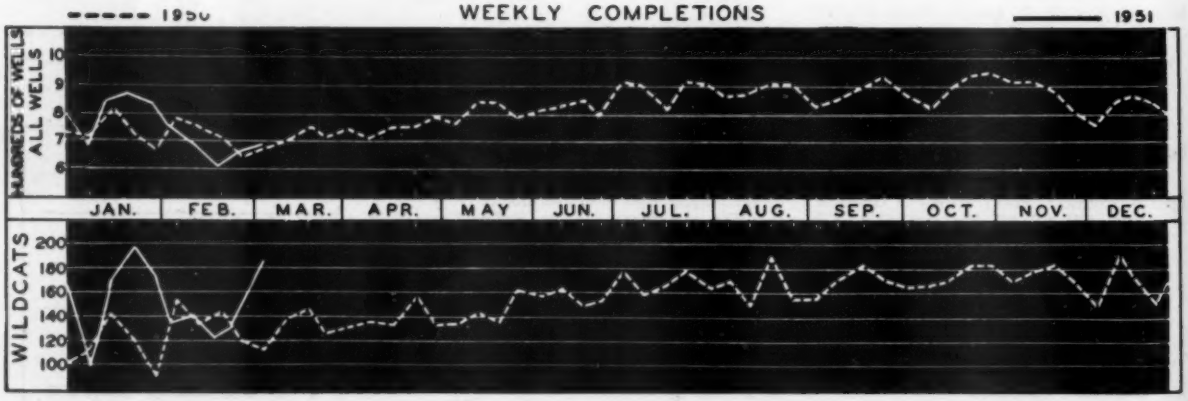
CURRENT STATISTICS

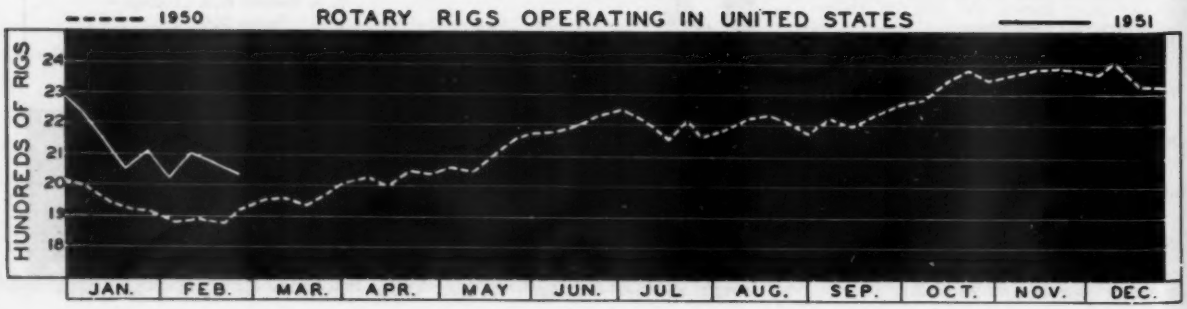
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED MARCH 3, 1951

	Total of all wells					Mar. 3		Wildcat completions and discoveries										
													Cumulative total, 1951					
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	8	4	0	*4	11,648	64	110	0	0	0	0	0	0	0	0	0	0
Pennsylvania	12	5	0	†7	20,899	130	192	0	0	0	0	0	0	0	0	1	1
West Virginia	7	1	6	0	19,196	110	106	0	0	0	0	0	0	0	3	2	5
Ohio	12	4	4	4	33,946	134	158	0	0	1	0	1	1	0	2	5	8
Indiana	33	5	1	27	45,224	180	166	0	0	1	21	22	3	0	1	40	44
Kentucky	15	9	0	6	18,965	136	133	0	0	0	2	2	2	0	0	19	21
Illinois	16	8	0	8	41,063	333	371	2	0	0	2	4	9	0	0	48	57
Michigan	13	3	1	9	32,301	108	137	0	0	1	8	9	0	0	2	41	43
Kansas	91	34	17	‡40	297,151	700	560	2	0	0	17	19	30	0	2	127	159
Nebraska	7	1	0	6	24,217	54	14	1	0	0	6	7	2	0	1	22	25
Oklahoma	79	53	3	23	306,924	912	800	1	0	0	9	10	35	0	5	117	157
Texas	293	179	13	101	1,434,131	2,695	2,599	16	3	3	58	80	107	12	15	462	596
North Central (Dist. 7-B & 9)	71	27	1	43	229,343	784	770	7	0	0	22	29	50	0	0	185	235
West (Dist. 7-C & 8)	113	91	1	21	618,678	829	759	3	1	0	15	19	23	2	0	101	126
Panhandle (Dist. 10)	11	4	7	0	32,496	137	196	0	0	0	0	0	0	0	0	5	5
Eastern (Dist. 5, 6, & 6-P)	13	7	0	6	62,322	181	185	0	0	0	3	3	0	0	0	32	32
Gulf Coast (Dist. 2 & 3)	43	27	3	13	271,581	394	364	2	1	2	8	13	20	7	12	65	104
Southwest (Dist. 1 & 4)	42	23	1	18	219,711	370	325	4	1	1	10	16	14	3	3	74	94
Louisiana	34	16	3	15	253,277	349	426	3	0	1	3	7	10	0	1	48	59
Northern	14	5	2	‡7	54,645	163	222	0	0	0	1	1	2	0	0	26	28
Southern	20	11	1	8	198,632	186	204	3	0	1	2	6	8	0	1	22	31
Arkansas	4	2	0	2	9,134	69	66	0	0	0	0	0	1	0	0	10	11
Mississippi	4	0	0	4	29,669	38	54	0	0	0	3	3	3	1	0	16	20
Southeastern States	2	2	0	0	8,844	13	11	0	0	0	0	0	0	0	0	2	2
Montana	0	0	0	0	0	24	22	0	0	0	0	0	0	0	0	2	2
Wyoming	9	6	0	3	57,754	107	108	0	0	0	2	2	2	0	0	19	21
Colorado-Utah	5	2	0	3	17,558	41	17	0	0	0	3	3	0	0	0	23	23
New Mexico	12	5	4	3	59,678	114	124	1	0	0	1	2	2	0	4	13	19
California	33	20	1	12	112,557	312	302	1	0	0	11	12	7	0	1	66	74
Miscellaneous	§2	0	0	2	12,816	7	1	0	0	0	2	2	0	0	3	4	7
Total United States	691	359	53	279	2,846,952	6,630	6,477	27	3	7	148	185	214	13	40	1,087	1,354
Total previous week	664	359	43	262	2,581,973	....	....	18	0	3	109	130	187	10	33	939	1,169
Total March 3, 1951	677	408	49	220	2,618,588	....	....	16	1	4	95	116	160	13	41	922	1,136

Service wells included: *4, †5, ‡1. §Incl. 1 Nev. at 10,311 ft., and 1 Iowa at 2,505 ft.





DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 3 crude oil	B. of M. Mar. demand	Feb. 24 crude oil
Alabama	2,500	2,400	2,300
Arkansas	80,250	88,000	80,200
California	956,800	970,000	956,300
Colorado	77,200	78,000	77,600
Eastern	58,700	66,000	52,300
Florida	1,700	1,600	1,600
Illinois	161,700	166,000	156,300
Indiana	26,800	31,000	28,100
Kansas	317,100	306,000	308,100
Kentucky	28,200	31,000	28,100
Louisiana	608,400	632,000	605,500
North Louisiana	116,400	.....	116,500
South Louisiana	492,000	.....	489,000
Michigan	40,800	45,000	41,600
Mississippi	105,550	114,000	100,950
Montana	22,900	23,000	23,100
Nebraska	10,000	8,000	9,800
New Mexico	138,325	140,000	136,325
Oklahoma	508,850	495,000	490,400
Texas	2,584,500	2,460,000	2,560,450
Dist. 1 (Southwest)	32,300	.....	31,800
Dist. 2 (Southwest)	154,200	.....	152,050
Dist. 4 (Southwest)	241,675	.....	239,800
Dist. 3 (Gulf Coast)	459,950	.....	457,000
Dist. 5 (Eastern)	47,500	.....	46,650
Dist. 6 (Eastern)	104,625	.....	103,800
East Texas field	271,575	.....	272,000
Dist. 7-C (West)	81,300	.....	78,575
Dist. 8 (West)	876,775	.....	864,925
Dist. 7-B (W. Central)	78,175	.....	77,400
Dist. 9 (N. Central)	146,850	.....	146,450
Dist. 10 (Panhandle)	89,575	.....	90,000
Utah	3,500	5,000	3,400
Wyoming	190,100	183,000	192,900
Total United States	*5,923,875	5,845,000	5,855,325
Change from previous week, up	68,550		
Canada	81,525	.....	112,590

Total U. S. production January 1-March 3 ..... †375,006,065 bbl.
Same period last year (crude plus cond.) ..... 307,632,250 bbl.

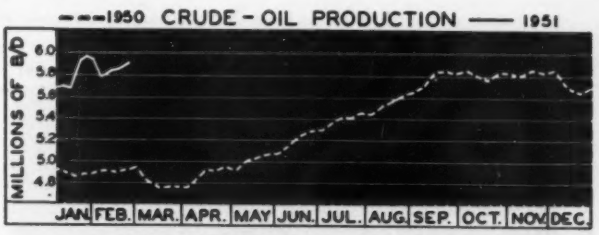
*Not including 107,550 bbl. condensate. †Including 6,500,935 bbl. condensate.

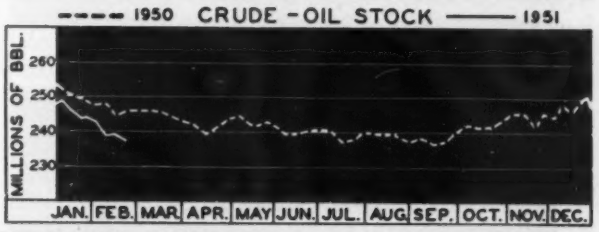
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

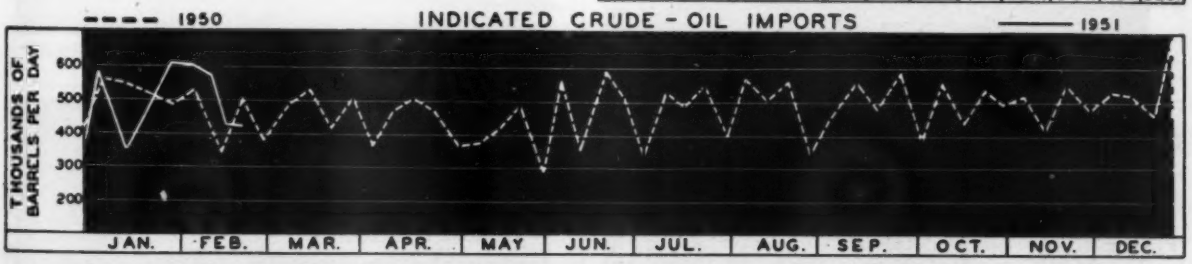
(Thousands of barrels)

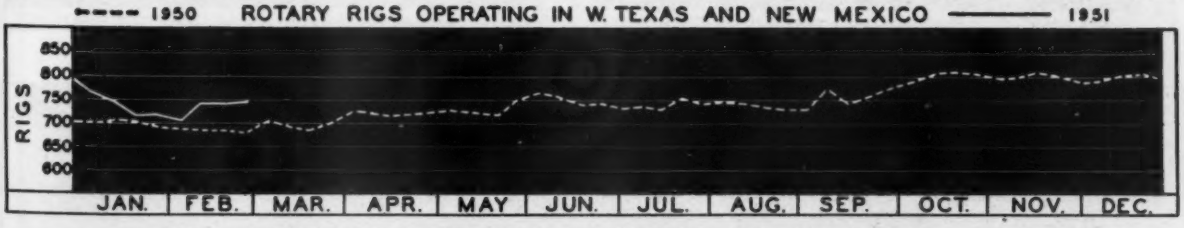
	Feb. 24, 1951	Feb. 17, 1951	Feb. 25, 1950
Pennsylvania Grade	2,043	2,058	2,784
Other Appalachian	1,396	1,319	1,895
Illinois, Indiana, Michigan	10,072	10 039	11,196
Arkansas	2,682	2,720	3,065
Louisiana	13,895	14,222	14,795
North	2,860	2,888	3,575
Gulf	11,035	11,339	11,220
Mississippi	3,040	3,222	2,449
New Mexico	6,918	6,997	7,060
Oklahoma and Kansas	37,713	37,234	35,254
Texas	110,474	111,288	109,031
East Texas	13,910	13,868	14,962
West Texas	43,074	43,327	38,592
Texas Gulf	25,855	25,864	28,325
Other Texas	27,635	28,229	27,152
Rocky Mountain	12,309	12,149	13,514
California	30,720	31,397	37,705
Foreign	5,942	6,315	7,036
Total	237,204	238,960	245,586

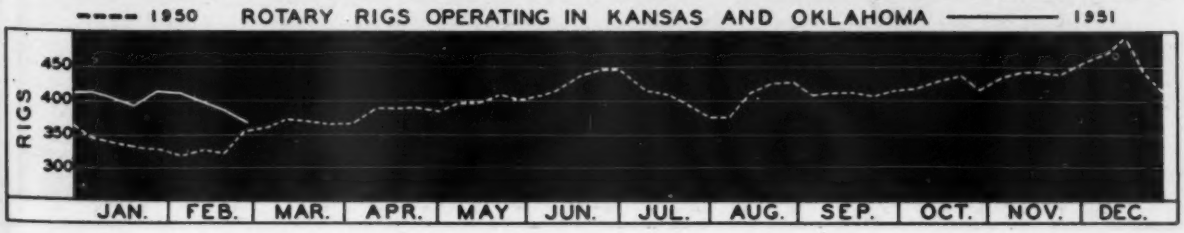
*Bureau of Mines









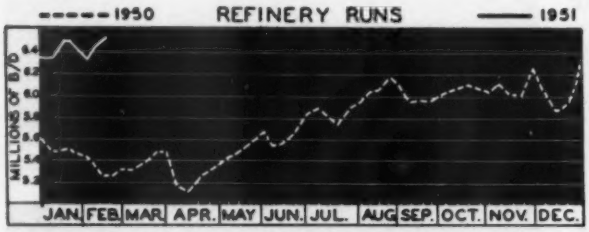


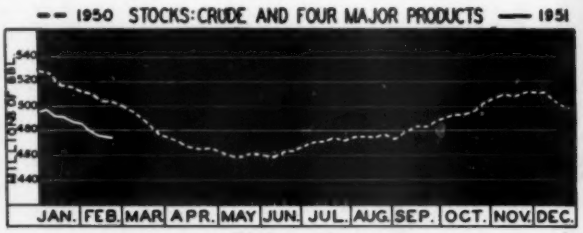
A.P.I. REFINERY REPORT, FEBRUARY 24

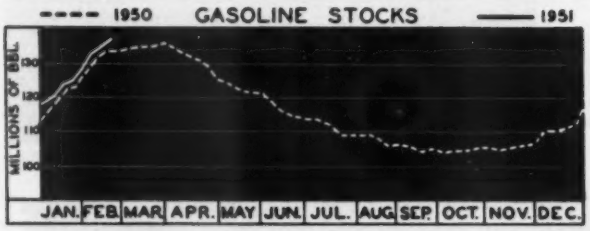
(Thousands of barrels)

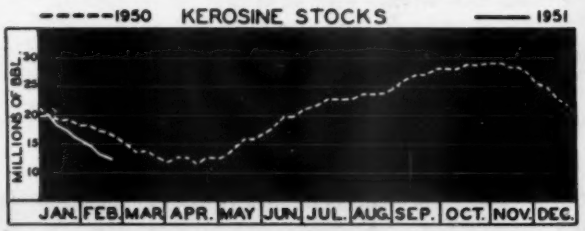
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, February 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,008	382.7	45.7	280.7	231.4	25,157	5,054	14,302	8,203	784	343.4	36.5	168.6	209.9
Appalachian:														
District 1	94	34.2	4.9	19.3	11.6	2,949	187	412	275	89	39.4	6.3	14.1	12.6
District 2	82	35.4	6.4	11.3	21.4	1,168	53	100	167	63	29.1	4.9	7.2	17.2
Ind., Ill., Ky.	1,227	620.4	71.1	264.1	182.0	30,954	2,754	6,406	2,901	980	496.1	72.2	170.6	169.6
Okla., Kans., Mo.	546	289.4	12.8	148.7	77.9	15,045	510	5,735	1,031	450	254.4	16.6	99.3	65.9
Inland Texas	225	143.0	14.0	28.9	41.6	4,363	320	713	671	206	137.3	12.9	27.8	41.1
Texas Gulf Coast	1,523	651.4	131.4	382.7	278.1	23,206	1,689	7,154	4,593	1,218	579.2	103.5	243.4	226.1
La. Gulf Coast	518	239.6	76.6	129.4	81.3	9,168	962	2,417	2,214	440	205.5	58.1	92.2	50.0
N. La. and Ark.	79	30.1	6.9	19.1	9.0	2,532	228	1,183	82	73	27.1	9.2	12.2	15.1
Rocky Mountain:														
New Mexico	13	7.3	.3	2.9	2.9	107	25	67	30	14	7.8	.3	2.5	3.3
Other Rocky Mtn.	209	106.9	7.0	39.9	43.4	5,139	204	1,216	714	175	82.4	5.3	35.7	40.3
California	1,000	433.2	—1.1	179.4	372.4	17,082	541	9,059	18,114	824	350.4	12.4	152.4	320.8
February 24, 1951	6,524	2,973.6	376.0	1,506.4	1,353.0	136,870	12,527	48,764	38,995	5,316	2,552.1	338.2	1,026.0	1,171.9
February 17, 1951	6,444	2,917.9	414.9	1,347.1	1,315.6	134,598	13,314	49,420	39,874	.....	.....	.....	.....	.....
February 25, 1950	5,277	2,529.0	354.9	984.3	1,122.1	133,888	16,227	56,050	48,663	.....	.....	.....	.....	.....

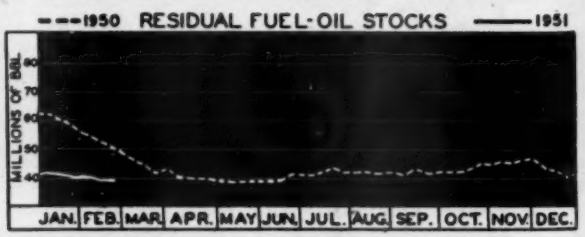
*At refineries including natural blended. †Finished and unfinished.

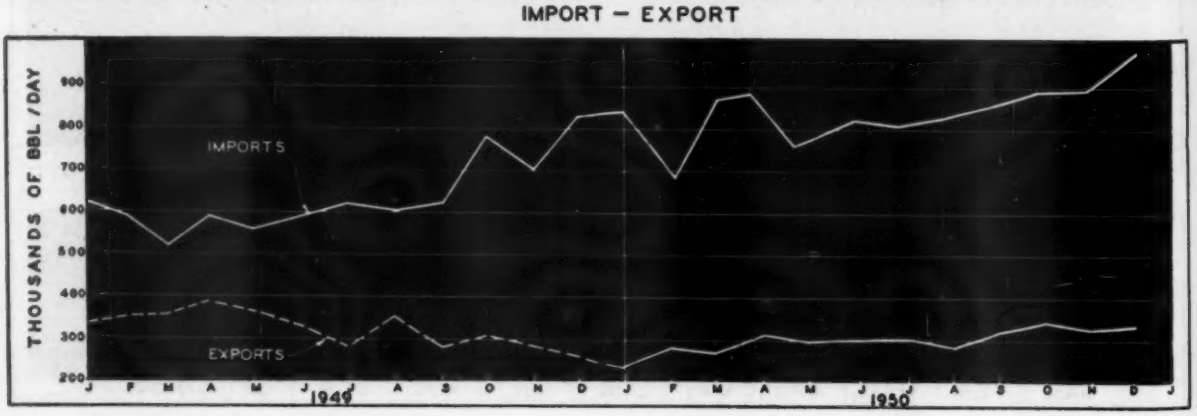












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

RECENT cold waves in north-central states will tighten distillate supplies in the Mid-Continent. Before the snow storm which blanketed the northern states at the first of March, Mid-Continent suppliers were beginning to feel a slight easing in the distillate market. In general, resellers in the high-demand areas start reducing distillate inventories after the end of February, but the cold weather early in March may prevent any heavy stock reductions before the last half of the month.

Demands for heavy fuel in the Mid-Continent are still high with shipments limited by production as well as tank-car availability. Many suppliers in the area are expecting above-normal demands to continue well into the summer months.

The over-all supply-demand picture for residual fuel has several balancing factors. Increased industrial activity will call for greater industrial use of energy. Residual supplies in the summer months of 1950 barely covered demands leaving no surplus for building inventories. Price ceilings are not high enough to encourage an increase in the percentage yield of residual. On the other hand, refinery runs will be greater this summer than in 1950. Runs started climbing in April of last year but did not reach 6,000,000 bbl. daily until August. Also, more natural gas will be available this summer, and residual imports may be higher than last year.

At least two independent suppliers on the East Coast have petitioned the Office of Price Stabilization for higher ceiling prices on distillate and residual fuels to cover part of the increased cost due to high tanker rates from the Gulf Coast. One-year charters now average about 90 per cent above the Maritime Commission base, or 1.75 cents a gallon for moving No. 2 fuel from the Gulf Coast to New York Harbor. Rates for residual fuel would be about 84 cents a barrel.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 5, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅛-11½	13.5-13.75	11½-12
42-44 w.w. kerosine	9¼-9⅜	10-10.1	8¾-9
No. 2 straw fuel oil	8⅜-8⅝	9-9.25	7¾-8
No 6 residual	$1.80-1.90	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅜	5⅞	6⅛
Grade 18-55	7.65	7.15	7.40

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

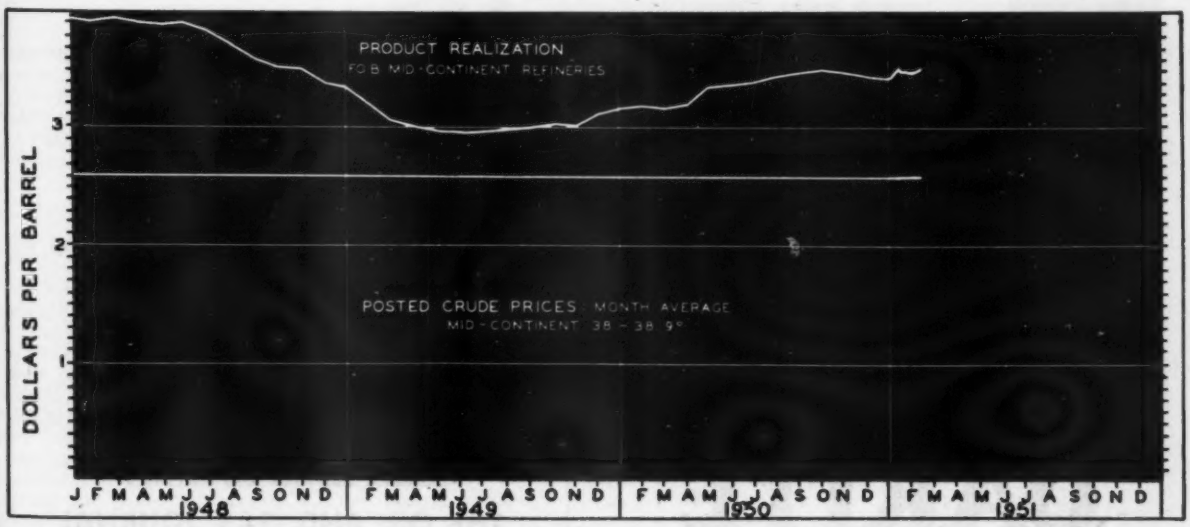
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

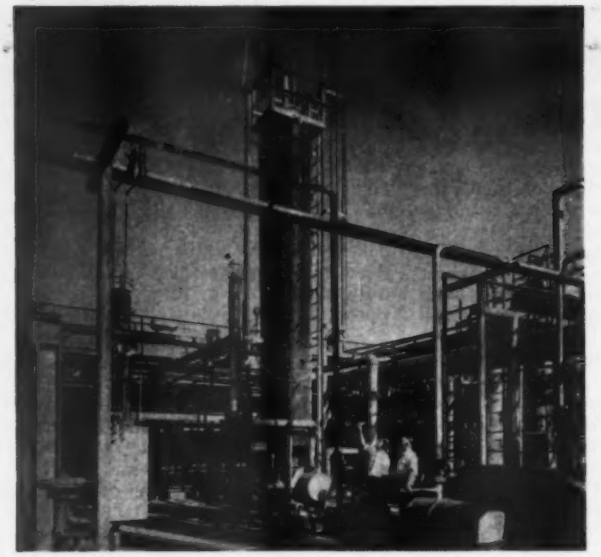
WAX

Mid-Continent

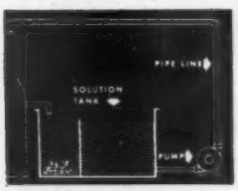
132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.52 for week ended February 24, $3.49 for previous week, and $3.23 for February 1950.



Clean towers in-place—save days—save dollars



Working size blueprints of this installation are available. No charge.

HERE'S the blueprint of an Oakite installation that cuts tower cleaning time to as little as 24 hours . . . saves up to $1000.

Material? Recommended Oakite detergent solution for speedy, thorough removal of grease, waxes, entrained crudes — sulfides, chlorides, oxides. Solution may be reclaimed and reused.

Method? *In-place* circulation of solution. No dismantling, reaming or sawing. Cleaning crew kept to a minimum . . . no outside help needed. Tower quickly restored to full capacity.

Results? Men who use it say: "Never spent 80 bucks so happily to save $1000." "Increased output 400 gallons per hour." "Good results—even trays near top come out clean."

Details absolutely *free*, including blueprints. Write Oakite Products, Inc., 44C Thames St., New York 6, N. Y.

FREE BOOKLET!
This 28-page illustrated booklet contains a wealth of tested techniques for cutting corners on many maintenance cleaning jobs. Send for FREE copy! No obligation.

Technical Service Representatives in Principal Cities of U. S. & Canada

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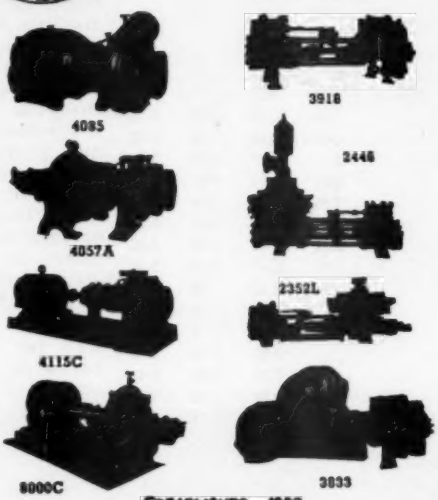
PETROLEUM SERVICE DIVISION

PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W. TENTH ST.

"DEEP ROTARY DRILLING"

This reprint from The Oil and Gas Journal's Annual "Drilling Contractors and Equipment" issue of October 5, 1950, pages 141-189, gives you a concise picture of one of the most important procedures in the petroleum industry: Drilling for oil with modern rotary equipment and with the latest techniques.

Contains action photographs and two-color diagrams to facilitate understanding of the text.

Gives clear picture of:

Rigging up	**Rotary equipment**
Drilling operations	**Pulling drill pipe**
Back into the hole	**Casing operations**

Cementing operations

Prices:

1 to 24	**$.50 each**
25 to 49	**.45 each**
50 to 99	**.40 each**
100 or more	**.35 each**

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THE OIL AND GAS JOURNAL

Box 1260, Tulsa, Oklahoma

EQUIPMENT MEN . . . in the News

P-B Names Mageors Assistant at Snyder

J. P. Magoffin, general sales manager, Patterson-Ballagh Division of Byron Jackson Co., has named Robert P. Mageors to be located in Snyder, Tex. Mageors will be assistant to Gene Mitchell who is in charge of P-B sales and service for the Snyder area.

Cloyd, Blackmon Moved Up By Dallas First National

Election of Clifton Blackmon as an assistant vice president of the First National Bank in Dallas to

C. BLACKMON

M. S. CLOYD

serve as director of advertising and public relations has been announced by Ben H. Wooten, president. Marshall S. Cloyd, vice president who has served as advertising director of the bank, is receiving the added title of assistant trust officer and will take over and supervise its program of highly specialized advertising and aid in its promotional work.

Since December 1943 Blackmon has been director of publicity and advertising for the Dallas Chamber of Commerce and editor of its official publication, Dallas Magazine. He attended Southern Methodist University and was graduated from University of Missouri with A.B. and B.J. degrees.

BJ Consolidates Oil Tool And Service Divisions

William C. Brooks, California sales manager, oil-tool division, and manager, service division, Byron Jackson Co., recently announced the consolidation of these two divisions. Orrie Luttrell will be in charge of sales and service for the two divisions, with headquarters in Bakersfield. Assisting Luttrell will be "Boots" Henderson. Prior to this consolidation, Luttrell had been San Joaquin Valley district manager of BJ service division.

J. B. (Jerry) Stumm, formerly sales representative for the oil-tool division in the Valley, has been transferred to the Mid-Continent area, with headquarters at Great Bend, Kans.

Brennan Visits Canada

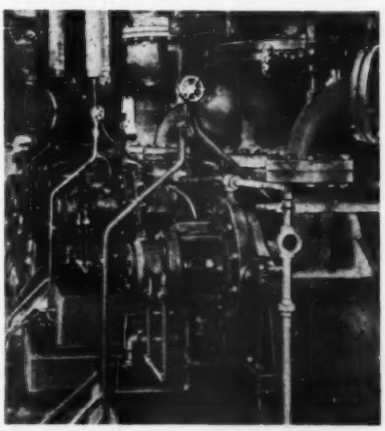
John Brennan, Fluid Packed Pump Co. sales engineer, recently visited Edmonton and Calgary, Canada, to bring National Supply Co., Ltd., of Canada the latest developments in Oilmaster pumps and technical information regarding increased pump efficiency.

Shell to Use Sigmund Pumps in Cardon Plant

A contract has been placed by Shell Oil Co. with Sigmund Pumps, Ltd., for a group of process pumps for the second distillation unit at the Shell refinery at Cardon, Venezuela.

In 1947 Sigmund supplied similar equipment for this plant. With the new unit, Sigmund pumps totaling 20,000 hp. will be used in the plant.

Sigmund process pumps are now operating in refineries all over the world, handling liquids at very high pressures and at temperatures up to 900° F. The original contract for the first distillation unit at Cardon was placed on behalf of Shell by Lummus Co.



A group of Sigmund hot-oil pumps in the distiller unit of the Shell plant at Cardon, Venezuela. These single-stage, double-entry-type centrifugal pumps are running at 3,600 r.p.m. They are operating at temperatures of 800° to 850° F. and have a capacity of 2,000 g.p.m. (imperial) against a head of 500 ft.

Barrett Holds First Coatings Service Meeting

The first meeting of the Barrett Division, Allied Chemical & Dye Corp., protective-coating sales service department was held recently at Ansley Hotel, Atlanta.

B. C. Cowart and R. G. Roberts conducted the meeting which was attended by D. H. Carroll, M. Ellis, K. H. Harmon, J. C. Mathews, and C. E. Romine.

Problems discussed concerned coating, better ways to help the contractor, and better service. The meeting will become an annual clinic.

Rockwell Announces Changes In Houston District

C. K. Madison, district manager for Rockwell Manufacturing Co., Houston area, has announced the transfers

M. F. GROOM

R. J. MUNN

of M. F. Groom and R. J. Munn, and the addition of W. A. Randle to his sales staff.

Groom has been in charge of the New Orleans office since joining Rockwell 5 years ago. He has been transferred to Houston where he will handle the gas-transmission companies and several of the major oil companies.

R. J. Munn has been in charge of the Corpus Christi office for the past several years and is also being moved to the Houston office.

W. A. Randle has just recently been added to the sales force. He received his B.S. in mechanical engineering from Louisiana State University and his M.S. from University of Texas. He was formerly employed by Dow Chemical Co. and McCarty Chemical Co. as production control engineer. He now replaces Munn in the Corpus Christi office.

Crandall Joins C. F. Braun

Ralph Kay Crandall has joined the engineering firm of C. F. Braun & Co. as a staff consultant in the consulting and research division. Formerly chief engineer for Beiswenger & Hoch in

Akron, Crandall moves to the Alhambra, Calif., headquarters of the Braun organization. He will serve as a consultant on mechanical problems of the petroleum and petrochemical industries.

Landry Makes Agreement to Use Atlas on Melco Unit

Max E. Landry, Inc., Tulsa, has announced the signing of a domestic distributor agreement with National Supply Co., Engine Division, Springfield, Ohio, for the application of the Atlas 10½-in.-stroke natural-gas engine for use in connection with Melco package gas-compressor units.

Landry also has a similar contract with Joy Manufacturing Co. for the application of its compressors in connection with Melco packaged gas-compressor units. Melco units are made in horsepower ratings from 10 to 340.

Franks Makes Heinritz Manager at Alice Branch

H. HEINRITZ

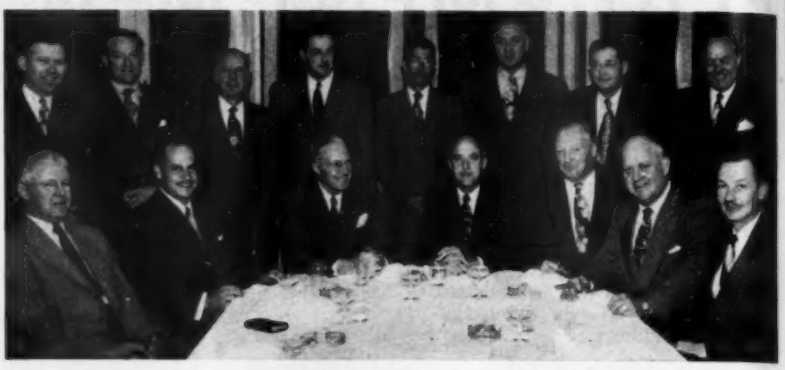
Hilmer Heinritz, with Franks Manufacturing Corp. of Tulsa since 1940, has been appointed district manager of Franks sales and service branch for Southwest Texas at Alice, according to Carl White, Jr., president of Franks. Heinritz has had wide experience in Franks assembly shop and service department.

Bahr Named Service Manager by Enterprise

HENRY D. BAHR

Henry D. Bahr has been appointed manager of the service department of Enterprise Engine & Machinery Co., it is announced by Paul I. Birchard, vice president. Bahr was previously Enterprise's Far Eastern service representative in the Philippines. He has been associated with the diesel industry since 1937 when he finished his diesel-engineering studies at Pratt Institute, New York.

Los Angeles Nomads Export Group Meets



Los Angeles Nomads, export managers and representatives, and foreign guests attending a recent luncheon meeting of the Los Angeles Nomads export group are: (seated) F. N. Gilstrap, export representative; Felix de la Mata, Peru; Earl M. Rees, Byron Jackson Co., Patterson-Ballagh Division and Oil Tool Division; Harry E. Hester, McCullough Tool Co.; I. B. Doyle, Hydril Co.; Hearn J. Paschall, H. C. Smith Oil Tool Co., and W. F. Bettis, M. O. Johnston Oil Field Service Corp. Standing are: D. O. Hanson, The Oil and Gas Journal; W. H. Sargent, Sargent Engineering Co.; T. G. Martin, R. J. Eiche and Associates; J. H. Flanagan, M. O. Johnston Oil Field Service Corp.; K. C. Templeton, Roland E. Smith Co.; J. A. Engstrand, Grant Oil Tool Co.; V. A. Mitchell, Security Engineering Co.; and W. E. Sievers, William E. Sievers Corp.

Stough Named to Welex Kilgore Station

JAMES E. STOUGH

James E. Stough has recently been appointed manager of the Welex field station at Kilgore, Tex., according to R. H. McLemore, vice president of Welex Jet Services, Inc.

The Kilgore station was opened by Welex late last year and is now fully staffed and equipped for rendering jet perforating service, Torpedo Jet service, and bridging plug service.

Stough was employed by Welex Jet Services for about 8 months before being made station manager.

Batten to Manage New Consolidated District

J. W. BATTEN

Due to a consolidation of two branches of United States Rubber Co., the New Orleans and Houston branches, into one Gulf Coast division, J. W. (Wes) Batten, formerly district sales manager, mechanical-goods division at Tulsa, will supervise the consolidated branches, making his headquarters in Houston.

I. M. Caldwell, formerly in the Oklahoma City branch of the division, will replace Batten as district sales manager, mechanical-goods division, at Tulsa.

Batten has served in the Tulsa territory for 24 years and has gained a broad experience in the application of mechanical rubber goods to the petroleum industry.

Neuhaus Made Cameron General Sales Manager

RALPH NEUHAUS

Ralph Neuhaus, oil-field-equipment executive, has been named general sales manager of Cameron Iron Works, according to an announcement by Herbert Allen, vice president and general manager.

After graduating from Cornell University in 1918 and serving as sales engineer with Chicago Pneumatic Tool Co. for 2 years, Neuhaus joined the engineering staff of Hughes Tool Co. in 1921 and became chief engineer in 1939. In 1942 he was made plant manager of the Hughes Aircraft Strut Division and soon thereafter was elected to the board of directors. When the Aircraft Strut plant was closed in 1945, he returned to Hughes Tool Co. as general manager of the oil-tool division and was made a vice president a year later.

The general sales division, headed by Neuhaus, includes the oil-tool division, headed by R. F. Farmer; the export division, headed by T. L. Putnam; and the industrial valve division, headed by Jack Harris.

(Continued on page 154)

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

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UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

BUCYRUS CABLE Tool Spudder 36-L 1948 Model, perfect condition, 54 foot mast, dual cathead, dual pneumatic tired wheels. All tools from 24", all accessories. An-Son Petroleum Corp., First National Bldg., Oklahoma City, Okla. Phone 7-4497.

D-13000 Caterpillar power unit; 60 HP 900 RPM slipring motor 3/60/2300; 30 HP 1200 RPM slipring motor 3/60/220; 30 HP 900 RPM slipring motor 3/60/220; 200 AMP. Hobart welder, motor driven, 3/60/220. Phone or write Wesley Steinhoff, Council Grove, Kansas.

FOR SALE: TELESCOPING MAST
87' Telescoping drilling mast with 4' substructure. Melton Supply Company, Seminole, Oklahoma.

LIGHT, portable, unitized equipment, good for 2000'. Rotary (**WILSON**) draw works, unitized with **BREWSTER** rotary table, Roller-bearing crown block with 4-leg telescoping mast DERRICK and 2000' of 3½" **Drill Pipe** and Oilwell **SWIVEL**, all for $10,500.00. JOHN BARRINGTON, Graford, Texas.

2,000 Feet

NEW STEEL PIPE

24" O.D.
.281 wall—40 foot lengths
Electric Weld
Immediate Delivery
Subject to prior sale
Write—Wire—Phone

Sonken-Galamba Corp.
2nd and Riverview (X-691)
Kansas City 18, Kansas
THatcher 9243

OIL WELL CASING AND TUBING FOR SALE

4000' New J-55 5½" O.D. 14# 8 R.T., R. 1 and 2 FOB Pittsburgh area

3000' A-1 Used H-40 5½" O.D. 14# 8 R.T., R. 2 FOB Central Michigan

3500' A-1 Used J-55 5½" O.D. 15½# 8 R.T., R. 2 FOB Central Michigan

1400' A-1 Used 10¾" O.D. 41.85# Drive Pipe 8 V.T., R. 1 FOB Cen. Mich.

6100' New J-55 27/8" O.D. 6.50# Ext. Upset. 8 R.T., R. 1 and 2 FOB North Central Ohio

MICHIGAN CARLON PIPE CO.
20120 Livernois Detroit 21, Michigan
DIamond 1-1400

EQUIPMENT FOR SALE

FOR SALE: Used Drilling Equipment—1—L. R. O. Waukesha Motor mounted on skids with Clutch and Drive Pulleys and Steel Housing; 1—6 x 12 Wilson Snyder Pump powered with 1—L90 A.C. Motor with starting motor. All equipment A-1 Shape. Telephone 1227—Wampler Bros., Longview, Texas.

NEED CASING AND TUBING?

6000 feet new 5½" 15.50# J-55 Range 2 Casing. 6000 feet new 4.7# J-55 EUE Range 2 Tubing, to be sold with complete drilling rig equipped with Lee C. Moore mast, Oilwell 64B drawworks, hydramatic brake, two NKU Waukesha engines, direct drive rotary with WAK Waukesha and torque converter, C-250 pump, Koehler light plant, Thompson shale shaker, Series 900 Sheaffer blow out preventer, 3 dog houses, 6000 feet 4½" drill pipe, seven 6¼" drill collars. All other equipment and appurtenances to make a complete rig, ready to drill. Located in North Texas.

Box D-895, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: IDEAL SLUSH PUMP
Model C-150
Melton Supply Co., Seminole, Okla.

10,000 BARREL TANK

55' Diameter x 25' 1" High, 5-Ring, Steel Cone Roof, Riveted Construction. Location: Caldwell, Kansas. Detailed specs. available upon request.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 Tulsa, Okla.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

NOW!! PIPE AND TUBING What Do You Need?

Quantity	Size	Approx. wall	Description
250,000'	1½" O.D.	.140"	Recond. Seamless Tubing, P.E., 14' and Over.
25,000'	2" O.D.	.145"	2.7# Recond. Seamless Tubing, P.E., 14' and Over.
75,000'	2¼" O.D.	.140"	Recond. Seamless Tubing, P.E., 14' and Over.
48,000'	2⅜" O.D.	.....	4# Good Used Lapweld Range 1 Tubing with New 11½ V-Threads and Collars.
10,000'	3" O.D.	.300/.375"	9.7# Seamless Tubing, P.E., 23'-26' Lengths.
25,000'	3½" O.D.	.145"	Recond. Seamless, P.E., 14' and Over.
150,000'	4" O.D.	.140/.160"	Recond. Seamless, P.E., 14' and Over.
3,000'	5½" O.D.	.....	15½# Good Used Lapweld T&C Range 1 Casing.
10,000'	6⅝" O.D.	.....	18.97# Good Grade Used Lapweld, Cleaned, Beveled Ends, 20' Random Mill Lengths.
8,500'	7" O.D.	.....	20# Good Used Lapweld Range 1 T&C Casing, 11½ V-Threads.
1,500'	8⅝" O.D.	.....	25# Good Recond. Casing, T&C, 8 V-Threads, Range 1.
1,000'	10¾" O.D.	.....	32.75# Good Used Lapweld T&C Casing, Range 1, New 8 Rd. Thds. and 8" Long Collars.

THIS MATERIAL IS AVAILABLE FOR IMMEDIATE SHIPMENT, SUBJECT TO PRIOR SALE.

OTHER SIZES OF LINE PIPE, SEAMLESS TUBING IN SUITABLE SUBSTITUTE SIZES FOR STANDARD PIPE (EXCELLENT FOR GAS, GATHERING AND FLOW LINES), CASING AND TUBING AVAILABLE FOR IMMEDIATE DELIVERY.

FOR FURTHER INFORMATION, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

LOW PRESSURE GAS OR FLOW LINE

IMMEDIATE DELIVERY—SUBJECT TO PRIOR SALE

125,000′ 4″ O.D. x approximately .150″ wall once used thoroughly reconditioned seamless steel tubing, 14′ lengths and over, ends ready for welding.

2,000′ 24″ O.D. x 14 gauge excellent used spiral weld pipe, 20′ lengths with Naylor wedge lock coupling.

For full details contact

A. J. STRUBEL, BROKER

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

FOR SALE: 17½″ Oilbath Gumbo Buster Rotary Table. 2—6″ Gumbo Buster Swivels. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Two Sullivan 37 special rigs mounted on International trucks, Waukesha and Buda drill motors, 1800 ft. Sullivan 2⅜ tool joint pipe 20 ft., two 900 gallon water tanks mounted on late model Chevrolet trucks, two 4 wheel rod trailers, two 250 gallon gasoline trailers. Equipment in top shape, used less than two years. Nothing additional needed to start drilling. Good supply extra parts. TRANS-TEX EXPLORATION CO. Box 558, Abilene, Texas. Phones 8130—2-7565.

FOR SALE: Complete refinery, absorption type, 35,000 bbl. capacity. Will sell as complete unit or by individual items. Complete inventory furnished on request. Contact W. W. Teer, Box 1351, Wichita Falls, Texas. Phone 2-1821.

GOOD BUY—8″ COLLARS
28 lb. Line Pipe at Dallas.
Oilton Pipe & Supply Co., Oilton, Okla.

FT. WORTH SPUDDER Super D, chain driven sand reel, heavy duty steel mast, Hercules drilling motor. Complete including all drilling tools, fishing tools, casing elevators, spider and slips. Ford Bullnose truck with winch and gin poles, water line and casing. Now running and ready to go, near Tulsa. Home Buyers Realty Co., 1141 East 37th St., Phone 77178 or 77628, Tulsa, Oklahoma.

FOR SALE: At Oklahoma City, 13—Used #8300 Electric IBM Time Card Recorders with Card Racks—each $150.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

TRADE: OIL FIELD TRUCK, 1946 K-7 International. Equipped with Tulsa winch. Will consider oilfield pup trailer on trade in. Earl F. Wakefield, 307 Union National Bank Building, Wichita, Kansas.

2000 Ft. 2½″ Upset 10-Thread Range 2 Seamless Tubing. Condition Excellent. 2—210 Bbl. Welded Steel Stock Tanks—Used 1 year for Diesel Fuel Storage. 900′ 7″ 23# Seamless Casing Range 2—500′ New 8 Round Thread, 400′ Used 10 Thread. Jay Kornfeld, 1121 Union National Bank Bldg., Phone 4-2121, Nite 6-0906. Wichita, Kansas.

FOR SALE: Practically new, approximately 3160′, 3″ EUE tubing, 8-round thread, 9.30# seamless. Write: Lawrence and Meltzer Oil Company, Box 414, Great Bend, Kansas.

HAVE a Gas Plant for Sale: Production can easily be doubled. Write T. E. Davis, Box 207, Davis, Oklahoma.

GAS COMPRESSORS
90 HP Direct Driven Superiors. Extra cylinders, 80 HP C & G Coopers. Location Oklahoma. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

FOR SALE: DRILLING MAST
1—96′ Lee C. Moore Cantilever Drilling Mast. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Galvanized Iron Pipe, diameters 1½″ through 3″ length 30″ through 88″ threaded for fill pipes or suction stubs for Gasoline Tanks. Armco Drainage & Metal Products, Inc., P. O. Box 1343, Atlanta 1, Georgia.

FOR SALE: 36-L Bucyrus-Erie Spudder, with L1-600 Cummins Diesel Engine, Unit skid mounted, 54′ steel telescoping mast, with catheads, 5″ to 7″ tools, new lines, steel dog house, 3 K.W. Diesel light plant, steel structure and floors. All equipment practically new. Will furnish inventory on request. J. C. Shaffer, Inc., P. O. Box 4365, Oklahoma City, Okla. Ph. 6-9905.

FOR SALE: 1—5½″ Drilling Stem 30 ft. long. 2—5″ Drilling Stems 30 ft. long. #2 Jenson Jacks. A. R. Daniel, Garnett, Kansas.

250 HP Natural Gas Engine with Generator; 165 HP Gas Engine; Diesel Engines; Generators. I Buy, Sell or Trade. A. C. Askew, Box 3073, Whittier Station, Tulsa 8, Oklahoma. Phone 6-6120.

FOR SALE: 11,000 feet of 4″ O.D. seamless tubing, random lengths, good, ready for line. Davis Construction Co., Parkville, Missouri. Phone 4051.

FOREIGN MADE seamless casing A.P.I. specifications and sheet steel. Subject to letter of credit. Box D-911, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 3500′ of used 4½ drill pipe with 5¾″ O.D. full hole tool joints. Melton Supply Company, Seminole, Oklahoma.

HELP WANTED

WANTED: RESEARCH AND DEVELOPMENT ENGINEERS AND PHYSICISTS WITH EDUCATIONAL BACKGROUND IN MECHANICAL, ELECTRICAL OR ELECTRONIC ENGINEERING, PHYSICS OR ENGINEERING PHYSICS FOR OPENINGS IN PLANT AND LABORATORY INSTRUMENTATION, PHYSICAL MEASUREMENTS, GEOPHYSICS, AND INDUSTRIAL ELECTRONICS. PREFER PERSONS WITH TWO TO FOUR YEARS EXPERIENCE IN EXPERIMENTAL RESEARCH DESIGN AND DEVELOPMENT OF INSTRUMENTS, INTRICATE MECHANISMS, ELECTRONIC APPARATUS, OPTICAL EQUIPMENT, SERVOMECHANISMS OR ALLIED FIELDS. POSITIONS ARE OF IMMEDIATE AND PERMANENT IMPORTANCE TO OUR OPERATIONS. WRITE PERSONNEL DIRECTOR, RESEARCH AND DEVELOPMENT DEPARTMENT, PHILLIPS PETROLEUM COMPANY, BARTLESVILLE, OKLAHOMA.

Chemical Engineers

THE FOSTER WHEELER CORPORATION specializes in the design and construction of processing plants for the petroleum industry. We are now expanding our organization for the design of processing units for the chemical industry and invite applications for employment from senior chemical engineers capable of directing this activity. Experience should include the design and/or operation of any of the following industrial plants: synthetic ammonia plants including the manufacture of nitric acid, nitrates and sulphates of ammonia; plants for the production and purification of olefins and aromatics from hydrocarbon feed stocks; plants for the synthesis of alcohols, glycols, detergents, etc. All replies will be treated in confidence. This is an opportunity for a few well-qualified engineers to acquire key executive positions and stable employment in an organization that has been in business for 50 years and is proud of its reputation with its customers and its employees. Mail complete resume of qualification, indicating salary requirements, to Personnel Director,

FOSTER WHEELER CORP.

165 BROADWAY NEW YORK 6, N. Y.

Qualified Personnel Will Be Invited to New York at Our Expense for Interview

EQUIPMENT FOR SALE

FOR SALE: One 5″ x 8″ Denver-Gardner FXX pump. Wm. M. Hanlon, Box 1734, Billings, Montana, Phone 93193.

FOR SALE: PIPE COUPLINGS, 2″—3″—4″—6″ and 8″—Casing Couplings 5½″ OD x 8 Rd. and 11½V. All new, perfect. Julius M. Fogelman, Reading, Pa.

FOR SALE: 40 H.P. Bettis steamer, Tanks and steamer cab, Tools, Conns, Steam hose. On 1948 2-Ton Chevrolet truck. Price $3500.00. Frank Jones, McPherson, Kansas.

EQUIPMENT WANTED

WANTED: Used spudder, either Bucyrus 33-W, or 24-L or Ideco No. 16, with or without tools. State age, condition, location, and price and inventory of tools if any in first letter. R. E. Skinner, P. O. Box 2939, Tampa, Florida.

HELP WANTED

WANTED: Associate or full professor of Petroleum Engineering in a leading institution. Must have successful professional and research background. Work to begin September fifteenth. Box D-897, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, EXECUTIVES, TECHNICAL MEN. SALARIED POSITIONS—$3600 TO $30,000. THIS CONFIDENTIAL SERVICE FOR OUTSTANDING MEN WHO DESIRE A CHANGE OF CONNECTION. WILL DEVELOP AND CONDUCT PRELIMINARY NEGOTIATIONS WITHOUT RISK TO PRESENT POSITION. SEND NAME AND ADDRESS FOR DETAILS. TOMSETT ASSOCIATES, 1204 BERGER BLDG., PITTSBURGH 19, PA.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00 Oil Industry Mailing List, Box 2603, Tulsa, Okla.

GEOPHYSICIST: Fully qualified and experienced for position of Chief Geophysicist with well-known contracting company. Application must state complete qualifications, references and salary expected. Box D-918, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

SUPERINTENDENT experienced in Petroleum Production, drilling and work-over jobs. Excellent opportunity with Independent Oil Producing Company. Please state age, experience, and give reference with first reply. Box D-913, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIGN Engineers and Draftsman with experience in concrete, structural, piping and conveyor belts. Openings from $6000 to $10,000 per year and more. Employer pays our fee. Tomsett Associates, 1203 Berger Building, Pittsburgh 19, Pa.

EXPERIENCED GEOLOGIST qualified for geological work in connection with reservoir engineering. Five years experience necessary. Experience in Permian Basin desirable. Box D-857, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Party chiefs, observers, computers for work in Canada. Minimum five years experience required. Do not apply otherwise. Give complete experience record. Box D-910, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS
Only Experienced Men Need Apply
WRITE ONLY
WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

WANTED
Field Supervisor

Capable; experienced; to supervise well-pulling. Must have thorough knowledge of industry and be free to travel. Exceptional opportunity with top pay, also bonus and pension plan, for man selected. Write in detail stating qualifications and draft status in first letter.

F. L. LA BARGE

Valley Steel Products Company

124 Sidney St., St. Louis 4, Mo.

ENGINEERS

Process (Chemical) Engineers
Construction Engineers
Project (Mechanical) Engineers

To Work On Petroleum, Petro-Chemical and Chemical Projects

Write in complete detail, giving positions held, references, education, salary expected. Personal interview can be arranged.

Address Personnel Department

E. B. BADGER & SONS COMPANY

75 Pitts St., Boston, Mass.

SITUATIONS WANTED

PETROLEUM ENGINEER: Married, 32, graduate of the University of Tulsa, one year petroleum production experience. Will consider any petroleum engineering position offering opportunity for advancement. Box D-894, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM GEOLOGIST Single, Draft-exempt, Nine years major company experience, four years independent geological experience. Specialist in all phases subsurface and well work. Opportunity for advancement important. Location—open. Box D-874, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM GEOLOGIST, ten years varied experience desires responsible position in Rocky Mountains or Foreign. Presently employed; speak four languages. Box D-879, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—PRODUCTION SUPERINTENDENT: 23 years experience in drilling and production operations; 12 years experience general production engineering; supervisory experience completion and workover operations. Desire connection with independent operator. Box D-896, The Oil and Gas Journal, Tulsa, Oklahoma.

QUALIFIED GREASE and LUBE OIL PROCESSING MAN desires change. Fifteen years of successful plant management; experienced in latest types of lubricants. Location unimportant if opportunity present. Box D-914, The Oil and Gas Journal, Tulsa, Oklahoma.

F. C. C. ELECTRONICS ENGINEER: 12 yrs. experience, age 34, veteran, family, desires Communications Supervisory Position Oklahoma area. Box D-917, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER: 4 years experience in drilling and workover desires employment in Mid-Continent area. 27 years old, single, non-reservist. Box D-916, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM and Natural Gas Engineer: 25, single, one year experience, foreign or domestic work speak Arabic. Box D-915, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING and Production Superintendent: More than 25 years experience with one employer, in drilling, well completion and production operations principally in Kansas, Oklahoma and West Texas. Best of references. Immediately available. Box D-919, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

WELL ESTABLISHED British oil equipment and supply company with head office in London is interested in acting as European and Sterling Area sales representative for all classes of equipment and supplies connected with the oil and mining industries. Box D-886, The Oil and Gas Journal, Tulsa, Oklahoma.

NOTICE Capitol Investors: One oil property $1,750,000, pays $330,000 per year net; One producing oil royalty $40,000, pays $800.00 per month net. 33,700-acre ranch 85 miles north of Santa Fe, New Mexico, $12.50 per acre. All the mineral and oil and gas rights go with it. One ranch 101,000 acres, 15 miles from Santa Fe, 29,500 acres deeded land, balance lease. Price $368,750. Half the oil and gas and mineral rights goes with it. Charlie Priolo, 2301 West 6th, Amarillo, Texas.

ROYALTIES

SPOT CASH PAID FOR PRODUCING ROYALTY. SMALL TO LARGEST BLOCKS IN SETTLED OR OLD PRODUCTION ONLY. Oil Specialists since 1934. GERBER & CO., 120 WALL STREET, NEW YORK.

WE will buy your producing override royalties and oil payments, no matter how small. Emray Oil Co., B. R. Irwin, President, 1045 Electric Bldg., Houston, Texas. Phone—Charter 3479.

OVERRIDING Royalty of from 1% to 2½% on 2800 acres, on good structure of two fields in western Wyoming. Bargain price for all. R. O. Barnsley, 950 Lincoln Ave., Palo Alto, California.

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

PRIVATE PARTY wants to invest up to $150,000.00 in producing royalties or settled production. Small or large deals considered. Box D-912, The Oil and Gas Journal, Tulsa, Oklahoma.

PECOS COUNTY ROYALTY FOR SALE

Under drilling block, now drilling. Have encountered two shallow pays. $60.00 per acre.

ALBERT E. WALKER
504 Hamilton Bldg., Wichita Falls, Texas

LEASE AND DRILLING BLOCKS

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

FOR RENT OFFICE SPACE

OFFICE SPACE FOR RENT, ODESSA, TEXAS, Heart of the Permian Basin. Several choice office spaces still available in modern building now being completely redecorated. Located in downtown ODESSA, heart of the Permian Basin and the supply and drilling capital of West Texas. On leases 2 years or longer, owner will rearrange layout to suit tenant. In face of building restrictions these spaces should be disposed of by May 1st. Request on your letterhead or phone call will bring floor plan and particulars. Direct inquiries to: M. LAVY, Box 2152, Odessa, Texas. Phone 2475.

BRAESWOOD CENTER

Houston, Texas

5500 square feet, second floor, air-conditioned office space, in building of outstanding design, available about July 1, 1951.

Adjacent to Shamrock Hotel, Texas Medical Center and new Prudential Southwest Home Office Building. An ideal location for Oil Operators, Insurance or Finance business, etc. This ultra modern Center will house the new Braeswood Postal Station.

Braeswood Center, Inc.

2265 W. Holcombe Blvd.
Houston 5, Tex.

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BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418. 815-15th Street, N.W., Washington 5, D. C.

EQUIPMENT MEN

(Continued from page 150)

Thornhill-Craver Announces Staff of New Territory

EARL GRISSOM

TOM BILLINGS

With the opening of a new sales territory in North and Central Texas, Thornhill-Craver Co. recently announced the following sales personnel changes.

BERT GRIFFIN

JAY HEMBREE

Tom Billings, formerly a petroleum engineer with the Gulf Oil Corp., has joined the Thornhill-Craver organization as a sales representative in the Houston territory. Billings is a graduate of the University of Texas petroleum engineering school. Earl Grissom, sales representative, has been transferred from Purcell, Okla., to Corpus Christi, Tex. Bert Griffin, sales representative, has returned to the Houston territory after a temporary sales assignment in the Snyder area. Jay Hembree, sales representative, has moved from Corpus Christi to Abilene where he will make his headquarters for the new North and Central Texas territory. Clint Horn has been transferred from Houston to Oklahoma City where he will be sales representative for the State of Oklahoma.

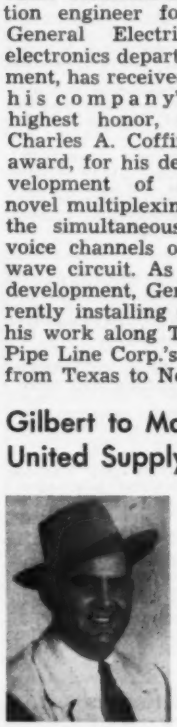
DeLuxe Products Opens New Dallas Division

The DeLuxe Products Corp., of LaPorte, Ind., a subsidiary of Walker Manufacturing Corp., has just announced a new oil-field and industrial division with headquarters in Dallas. The division will be headed by J. F. Austin. Austin says that the new division will improve DeLuxe's oil-field facilities and engineering service as it applies to fuel and lubricating-oil filters. The company will also maintain warehouse facilities in Dallas.

General Electric Engineer Lauded for Microwave Work

Thomas G. Custin, microwave radio communication engineer for General Electric electronics department, has received his company's highest honor, a Charles A. Coffin award, for his development of a novel multiplexing system permitting the simultaneous use of up to 24 voice channels over a single microwave circuit. As a result of Custin's development, General Electric is currently installing equipment based on his work along Transcontinental Gas Pipe Line Corp.'s 1,840-mile pipe line from Texas to New York.

Gilbert to Manage New United Supply Office



United Supply & Manufacturing Co. of Tulsa has announced the opening of a new office in San Antonio, with Clifford Gilbert as manager. Gilbert has been with United since 1940 and has worked in its supply stores at Stonewall and Seminole, Okla., and Edna and Victoria, Tex.

Century Transfers Barnes To Mid-West Area

Century Geophysical Corp., Tulsa, has announced the transfer of Arnold Barnes from sales engineer in the Tulsa office to representative of the middle western area in Dayton. He will serve in this new capacity in Ohio, Illinois, Indiana, Tennessee, and Kentucky.

Barnes joined Century in 1946. Since then he has served as party manager, equipment engineer, field engineer, and sales engineer. Prior to his affiliation with Century, Barnes was with Magnolia Petroleum Co. for 3 years.

International

(Continued from page 63)

The entire Eastern Hemisphere is reported to be short of TEL. Refiners throughout the Eastern Hemisphere depend on the United States for their marginal requirements, and the product is now in short supply in the United States. Until TEL plants are built in the Eastern Hemisphere to meet its requirements, the only way to upgrade motor fuel is to use higher base stocks.

New Plant on Stream

A new refinery built by Italian technicians and labor was placed on stream recently near Ancona on the Adriatic Coast in central Italy.

The plant is the property of Anonoma Italiana Petroli, an unaffiliated Italian company. At present only distillation equipment is being operated.

The new refinery is using Middle East crude and is running at a rate of between 2,000 and 3,000 bbl. daily. Total capacity of the facilities is about 10,000 bbl. daily. Operations of Italian refineries are controlled by government license.

Construction of the refinery was carried out under supervision of the Breda Co. of Milan. Reports are that cracking equipment is planned for later installation.

Geophysical Work Initiated

A comprehensive program of geophysical exploration has been initiated by Deutsche Vacuum Oel, A.G. (Socony-Vacuum) in the Bavarian foreland of the Alps in western Germany.

Modern reflection seismograph equipment made by Magnolia Petroleum Co. and imported by Deutsche Vacuum is being used for the first time in Germany. The work is being carried out on behalf of a group of companies comprising Gewerkschaft Elwerath, Preussag, and Bayerische Mineral-Industrie, A.G., (also a Socony-Vacuum subsidiary).

Emsland to Get Houdry Unit

Houdry Process Corp. has announced that Gewerkschaft Erdol-Raffinerie Emsland, a German oil company, will install a Houdriflow catalytic cracking unit at the new 12,000 bbl. per day Lingen refinery located near the Dutch border.

The first Houdriflow unit to be

built outside the United States will be located in the new Emsland oil field. A Houdry fixed-bed unit, located at the Berre, France, refinery of Cie. de Raffinage Shell-Berre, has been in operation for several years, and was the first catalytic cracking unit in Europe.

Work to Start on Line

Construction work is scheduled to get under way on the Le Havre-Paris products pipe line as soon as right-of-way agreements with landowners are obtained.

When completed next year, the line will deliver about 26,000 bbl. daily of light products from the English Channel port city to the French capital. Earlier reports were that the line will be 10-in. Plans call for using some of the pipe of an old oil line laid before the war as a security measure between Donges and Montargis but never placed in operation.

The French Government has authorized construction and operation of the Paris line by a mixed government-private capital company, Soc. des Transporte Petroliers par Pipe Line. Of the company's 890,000,000-franc capital (equivalent to about $2,500,000), 310,000,000 francs were subscribed by the French Government, 55,000,000 by the port of Le Havre, an autonomous organization, 110,000,000 by Cie. Francaise des Raffinage which is controlled by Cie. Francaise des Petroles, and the remainder by the most important distributing companies. The line will cost the equivalent of about $5,600,000.

Length of the line will be about 150 miles. In Paris, it will serve 12 terminals. The government favored the project as one which would make possible lower transportation costs and reductions in the price of products in the area served out of the Paris terminals.

Western Kentucky

(Continued from page 143)

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Superior Oil Co. 1 Tripplett et al., SE NE SW SW 2-O-24, dry, TD 2,508 ft.

Hopkins County: Skiles Oil Corp. 1 King, N½ SE NE NW 5-J-22, dry, TD 2,293 ft.

EASTERN KENTUCKY

ASHLAND.—Four more wells have been added to East Pilot pool along the Wolfe and Powell County line. On Whites Branch in Powell County, Sherman Hall completed 5 E. H. Fuller as a dry hole in the Corniferous lime, while 6 E. H. Fuller made an initial potential of 20 bbl. oil daily from the Corniferous topped at 867 ft. and bottomed at 960 ft. J. S. Miller, Trustee, completed 3 J. S. Abbott heirs for 10 bbl. daily from the Corniferous lime at total depth of 862 ft. The 2 Abbott heirs was dry.

In Big Sandy gas field, Kentucky West Virginia Gas Co. completed 5971 George Robinett in the Maxon (Mississippian) sand. Located in the Pike County sector, the well made 848,000 cu. ft. of gas daily at a total depth of 2,050 ft.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 1669.44 acres in T. 11 N., Rs. 57 and 58 E., and T. 10 N., R. 58 E., P.M., Montana, within the known geologic structure of the Cedar Creek field, will be offered in five parcels for oil and gas leasing, through competitive bidding, at 1 p. m., Eastern Standard Time, March 21, 1951, when bids will be opened. The details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land Office at Billings, Montana, or to this office. Marion Clawson, Director.

LEGAL

Department of the Interior, Wind River Indian Agency, Fort Washakie, Wyoming, 19 February, 1951. Notice is hereby given that SEALED BIDS will be received until 2:00 p.m. Mountain Time, 20 March 1951 and opened at that time in the Office of the Superintendent of the Wind River Indian Agency, Fort Washakie, Wyoming, for the leasing of the following unit of allotted lands located in Fremont County, Wyoming, for oil and gas mining purposes. UNIT NO. 1: Allot. No. 5, allottees, description of tracts and acreage: 1900, Hrs. Paul T. Harris, N½SE¼NE¼, Sec. 23, 20.0; 1901, Hrs. Fannie Harris, S½SE¼NE¼, Sec. 23, 20.0; 1902, Hrs. Sadie Harris, N½NE¼-SE¼, Sec. 23, 20.0; 1903, Hrs. Walter Harris, S½NE¼SE¼, Sec. 23, 20.0; 1339, Hrs. Coming Dodge, SW¼NE¼, SE¼NW¼, Sec. 23, 80.0; 1337, Susan Littleshield, W½NW¼, Sec. 23, 80.0; 1340, Hrs. Sage Woman, NW¼-SW¼, Sec. 23, 40.0; 1347, Hrs. Big Woman, N½NE¼, Sec. 22, 80.0; 1898, Hrs. Thick Harris, N½SW¼NW¼, Sec. 24, 20.0; 1899, Hrs. Cynthia Harris, S½SW¼NW¼, Sec. 24, 20.0; 1905, Hrs. Shoshoni Harris, N½-SE¼NW¼, Sec. 24, 20.0; 1906, Hrs. Dominick Harris, S½SE¼NW¼, Sec. 24, 20.0; 1356, Hrs. Louis Iron, N½NW¼, Sec. 15, 80.0; 1355, Hrs. May Friday, E½, NE¼, Sec. 15, 80.0; 1349, Hrs. Charles Beaver, S½-SW¼, Sec. 15, 80.0; 1352, Hrs. Stephen Tallow, N½SW¼, Sec. 15, 80.0; 1350, Hrs. Sleeping Hopper, S½SE¼, Sec. 15, 80.0; 1331, Hrs. Samuel Friday, W½NW¼, Sec. 14, 80.0; 1330, Hrs. Caroline Friday, E½-NW¼, Sec. 14, 80.0; 1329, Hrs. Janice Friday, W½NE¼, Sec. 14, 80.0; 1328, Hrs. Sadie Friday, E½NE¼, Sec. 14, 80.0; 1334, Hrs. Mamie Oldman, NE¼SE¼, Sec. 14, 40.0; 1335, Hrs. Helna Armajo, SE¼SE¼, Sec. 14, 40.0; NE¼NE¼, Sec. 23, 40.0; 1333, Hrs. Stadie Dodge, NW¼SE¼, Sec. 14, 40.0; NE¼SW¼, Sec. 14, 40.0; 1336, Hrs. Saddle Dodge, SW¼SE¼, Sec. 14, 40.0; SE¼SW¼, Sec. 14, 40.0. All of the above described individually allotted lands in Twp. 1 S., R. 1 E., W.P.M., Wyoming, containing 1,440.00 acres more or less as surveyed.

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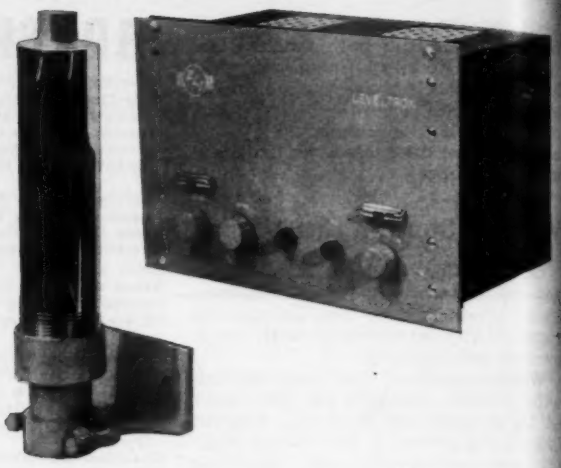

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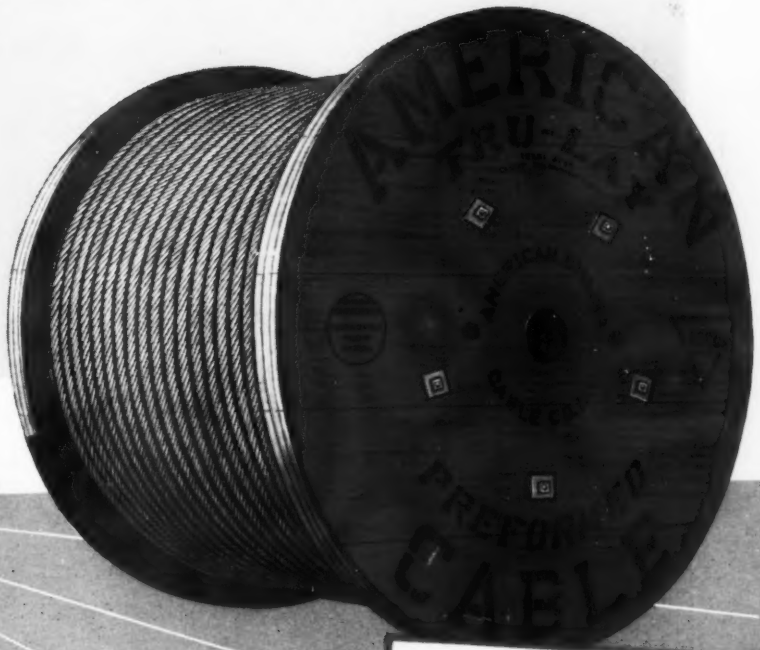

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